

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

CIENA CORPORATION,  
Petitioner,

v.

K. MIZRA LLC,  
Patent Owner.

---

U.S. Patent 8,782,282

Title: NETWORK MANAGEMENT SYSTEM

---

*Inter Partes* Review No.: IPR2025-01362

---

**DECLARATION OF DR. DOUGLAS C. SCHMIDT IN SUPPORT OF  
PETITION FOR *INTER PARTES* REVIEW OF  
U.S. PATENT NO. 8,782,282**

***Mail Stop "PATENT BOARD"***  
Patent Trial and Appeal Board  
U.S. Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450

## TABLE OF CONTENTS

	<b>Page</b>
I. INTRODUCTION .....	1
II. MY BACKGROUND AND QUALIFICATIONS .....	3
III. RELEVANT LEGAL STANDARDS .....	9
IV. OVERVIEW .....	12
A. Summary of the '282 Patent.....	16
B. Prosecution History of the '282 Patent .....	21
C. Claim Construction .....	22
D. Priority Date of Claims .....	23
E. Person of Ordinary Skill in the Art (POSITA) .....	23
V. State of the Art.....	24
1. Network Management Systems/Operations Support Systems .....	25
2. Adapters .....	31
3. Load Balancing .....	33
4. Failover and Recovery .....	37
VI. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE.....	42
A. Ground 1: Claims 1-22 Are Obvious over <i>Secer</i> in View of <i>Dinker</i> .....	42
1. <i>Secer</i> (EX-1004) .....	42
2. <i>Dinker</i> (EX-1005) .....	46
3. Motivation to Combine <i>Secer</i> and <i>Dinker</i> .....	48

4.	Detailed Application of <i>Secer</i> in Combination with <i>Dinker</i> to the Challenged Claims .....	56
	<b>Claim 1</b> .....	56
[1pre]	A method, comprising:.....	56
[1ai]	receiving, at a first application server instance selected from a plurality of application server instances based on a load balancing process, first adapter processed information from a first adapter,.....	56
[1aii]	wherein the first adapter processed information comprises event information received by the first adapter from a network element and processed by the first adapter based on a first communication protocol;.....	63
[1b]	processing, by the first application server instance, the first adapter processed information based on an event management service to produce application processed information;.....	65
[1ci]	sending, by the first application server instance, the application processed information to a gateway device,.....	67
[1cii]	wherein the gateway device is one of a plurality of gateway devices respectively associated with the plurality of application server instances and is configured to transfer the application processed information to a second adapter of a plurality of second adapters configured to process the application processed information based on a second communication protocol to produce second adapter processed information and transfer the second adapter processed information to an operation support system device; and.....	69
[1d]	in response to determining that the first application server instance has become disabled, facilitating establishing an association between the first adapter and a second application server instance of the plurality of application server instances and between the gateway device and the second application server instance. ....	73
	<b>Claim 2</b> .....	78

[2] The method of claim 1, wherein the first application server instance is configured to execute on a separate physical machine from the first adapter.....	79
<b>Claim 3</b> .....	
[3pre] A system, comprising:.....	80
[3a] a first application server instance configured to receive first adapter processed information from a first adapter[,] process the first adapter processed information based on an event management service to yield application processed information, and.....	80
[3b] send the application server processed information to a gateway device, .....	81
[3c] wherein the first adapter processed information comprises event information from a network element that has been processed by the first adapter based on a first communication protocol; and .....	81
[3d] a load balancing component configured to select the first application server instance from a plurality of application server instances based on a load balancing process;.....	81
[3e] wherein the gateway device is one of a plurality of gateway devices respectively associated with the plurality of application server instances and is configured to transfer the application server processed information to a second adapter of a plurality of second adapters configured to process the application server processed information based on a second communication protocol to yield second adapter processed information, and.....	81
[3f] send the second adapter processed information to an operation support system device, and.....	81
[3g] wherein, the first adapter and the gateway device are further configured to, in response to disablement of the first application server instance, establish an association with a second application server instance of the plurality of application server instances. ....	82
<b>Claim 4</b> .....	
[4] The method of claim 1, further comprising converting, by the second adapter, a protocol specific message associated with the first	

application server instance to a formatted message associated with the second communication protocol.....	82
<b>Claim 5</b> .....	84
[5] The method of claim 1, further comprising selecting the first application server instance based on a determination that the first application server instance has a lowest processing load of the plurality of application servers instances. ....	84
<b>Claim 6</b> .....	85
[6] The method of claim 1, wherein the first communication protocol and the second communication protocol comprise one or more communication protocols associated with at least one of extensible markup language, simple network management protocol, common object request broker architecture, or transaction language 1. ....	85
<b>Claim 7</b> .....	86
[7] The method of claim 1, further comprising at least one of collecting, recording, or publishing the event information in accordance with the event management service for access by the operation support system device. ....	86
<b>Claim 8</b> .....	87
[8] The method of claim 1 wherein the plurality of gateway devices comprise a plurality of physically or logically separated gateway devices. ....	87
<b>Claim 9</b> .....	88
[9] The method of claim 1, wherein the gateway device is a physically and logically separate machine from the first application server instance. ....	89
<b>Claim 10</b> .....	90
[10] The method of claim 1, further comprising converting, by the first adapter, a message associated with the first communication protocol to a protocol specific message associated with the first application server instance. ....	90

<b>Claim 11</b> .....	91
[11] The method of claim 1, further comprising processing, by the gateway device, a function associated with the application server processed information. ....	91
<b>Claim 12</b> .....	92
[12] The method of claim 1, wherein the event information relates to a configuration of the network element.....	92
<b>Claim 13</b> .....	92
[13] The method of claim 1, further comprising executing the first adapter and the second adapter on one or more virtual machines.....	92
<b>Claim 14</b> .....	93
[14] The method of claim 1, wherein the first adapter and the second adapter are configured to communicate with the first application server instance over a remote method invocation interface. ....	93
<b>Claim 15</b> .....	94
[15] The system of claim 3, wherein the event information is associated with a configuration of the network element.....	94
<b>Claim 16</b> .....	94
[16] The system of claim 3, wherein the first application server instance comprises a performance manager component configured to collect performance data from a plurality of network elements respectively associated with a plurality of first adapters including the first adapter.....	94
<b>Claim 17</b> .....	95
[17] The system of claim 16, wherein the performance manager component is further configured to deliver at least a subset of the performance data to one or more of the plurality of network elements. ....	95
<b>Claim 18</b> .....	97
[18] The system of claim 3, wherein the first communication protocol and the second communication protocol comprise one or more	

communication protocols associated with at least one of extensible markup language, simple network management protocol, common object request broker architecture, or transaction language 1.....	97
<b>Claim 19</b> .....	97
[19] The system of claim 3, wherein at least one of the first adapter or the second adapter are executed on one or more virtual machines. ....	97
<b>Claim 20</b> .....	97
[20] The system of claim 3, wherein the first adapter and the second adapter are configured to communicate with the first application server instance over a remote method invocation interface. ....	97
<b>Claim 21</b> .....	97
[21] The system of claim 3, wherein the load balancing component is configured to select the first application server instance based on a determination that the first application server instance has a lowest processing load of the plurality of application server instances.....	98
<b>Claim 22</b> .....	98
[22] The system of claim 3, wherein the plurality of gateway devices comprises a plurality of physically or logically separated gateway devices. ....	98

CONCLUSION AND DECLARATION

APPENDIX A – MATERIALS RELIED UPON

APPENDIX B – *CURRICULUM VITAE*

I, Dr. Douglas C. Schmidt, declare as follows:

## **I. INTRODUCTION**

1. I am over the age of eighteen (18) and otherwise competent to make this declaration.

2. I have been retained by Ciena Corporation (Petitioner) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office. Although I am being compensated at my rate of \$600 per hour for the time I spend on this matter, no part of my compensation depends on the outcome of this proceeding, and I have no other interest in this proceeding. To the best of my knowledge, I have no financial interest in Petitioner.

3. The Petition for *inter partes* review involves U.S. Patent No. 8,782,282 (the “’282 Patent”) (EX-1001), titled “NETWORK MANAGEMENT SYSTEM” and listing Eileen Zhou, Roger Liu, Vijoy Choyi, Moshe Itah, and John Z. Yu as the inventors.

4. For the purposes of this *inter partes* review as discussed later, I have been instructed to assume that the effective filing date of the claims of the ’282 Patent challenged by the Petitioner in this *inter partes* review is no earlier than December 19, 2003, the filing date of non-provisional application 10/742,573.

5. I understand that according to USPTO records, the ’282 Patent is currently assigned to K.MIZRA LLC (“K.MIZRA” or “Patent Owner”).

6. The '282 Patent is directed to systems and methods for a network management system for communication network. I am familiar with the technology described in the '282 Patent as of the earliest possible priority date of December 19, 2003.

7. In preparing this Declaration, I have reviewed the '282 Patent (EX-1001), the file history of the '282 Patent (EX-1002), and each of the documents cited herein, and I have considered these documents in light of the general knowledge in the art as of December 19, 2003. In formulating my opinions, I have relied upon my experience in the relevant art. I have also considered the viewpoint of a person of ordinary skill in the art ("POSITA") in the relevant field, as of December 19, 2003, who I describe below (§IV.E). For convenience, the materials I considered in forming my opinion are listed in Appendix A.

8. The opinions and comments formulated during this assessment are based on observations and information available at the time of the investigation. The findings presented herein are made to a reasonable degree of scientific certainty. I have made every effort to accurately and completely investigate all areas of concern identified during our investigation.

9. I have been asked to provide my technical expertise, analysis, insights, and opinions regarding the '282 Patent and relevant references that form the basis of the arguments set forth in the accompanying Petition for *inter partes*

review of the '282 Patent. As described in detail below, I offer the following opinions in this Declaration:

- A POSITA would have found Claims 1-22 of the '282 Patent obvious over *Secer* in view of *Dinker*.

## II. MY BACKGROUND AND QUALIFICATIONS

10. I am the Dean of the School of Computing, Data Sciences & Physics and a tenured full professor of Computer Science at William & Mary, where I started in January 2025. My research and teaching spans a broad range of software systems, including—but not limited to—network programming, distributed object computing, middleware platforms, real-time operating systems, distributed real-time and embedded systems, mobile cloud computing, software engineering, and generative artificial intelligence (AI). Prior to becoming the Dean, I was served as the Director of Operational Test and Evaluation (DOT&E) for the United States Department of Defense, where I was the senior advisor to the Secretary of Defense on operational and live fire test and evaluation of Department of Defense weapon and information systems. As an appointee of President Biden, I was confirmed unanimously by the United States Senate in February, 2024.

11. Prior to being the DOT&E, for over 20 years I was the Cornelius Vanderbilt Professor of Engineering in the Department of Computer Science at Vanderbilt University in Nashville, TN, where I also serve as the Associate Chair

of the Computer Science department. From 2018 to 2022 I served as the Associate Provost for Research Development and Technologies and the co-Director of the Data Science Institute at Vanderbilt University. I became a Full Professor with tenure at Vanderbilt University when I joined in January 2003.

12. I have been a full-time university professor since 1994. I was previously a tenured professor at the University of California, Irvine in the Electrical and Computer Engineering department, from 2000 to 2003, and before that at Washington University in St. Louis, MO in the Computer Science and Engineering department and the Mallinckrodt Institute of Radiology, from 1994 to 1999. In addition, I served as the Chief Technology Officer and Deputy Director for the Software Engineering Institute (SEI) at Carnegie Mellon University from 2010 to 2012, where I led the SEI's research, development, and operational efforts related to software engineering and cyber-security.

13. I received my Doctor of Philosophy (Ph.D.) degree in Computer Science from the University of California (UC) Irvine in Irvine, CA in 1994. I also earned a Master's Degree in Computer Science from UC Irvine in 1990, as well as a Bachelor's Degree in Sociology in 1984 and Master's Degree in Sociology in 1986 from William & Mary in Williamsburg, VA. I first started programming in 1983 when I was an undergraduate student taking statistics courses. A copy of my curriculum vitae is attached as Appendix A to this report.

14. Prior to completing my graduate studies at UC Irvine I worked with the Urban Information Systems (“URBIS”) project at UC Irvine’s Public Policy Research organization, where I studied end-user computing interactivity with municipal institutions in 40 cities across the United States. I also worked at the International Center for Information Technology (“ICIT”) in Washington D.C. on projects assessing techniques for improving software productivity for enterprise IT systems.

15. I first started programming in 1983 when I was an undergraduate student taking statistics courses at William & Mary in Williamsburg, VA. While I was an undergraduate and graduate student at William & Mary I programmed with the SPSS and SAS statistical packages. I also worked as a programmer at the National Center for State Courts during the summer of 1986 as I was completing my Master’s degree in Sociology at the College of William & Mary.

16. From 1985 through 1994 I learned how to program in Pascal, C, C++, Ada, Prolog, and Lisp, both at the William & Mary (where I was a graduate student in the Sociology department) and at UC Irvine (where I was a graduate student in the Information and Computer Science department). During this time period I also learned how to program networked software services and applications using platforms, libraries, and protocols available at the time, such as UNIX Sockets and TCP/IP. I was also an avid user of popular networked applications,

such as remote login (rlogin and TELNET), email, and file transfer (FTP), which provided distributed services for accessing remote computer resources and collaborating over local area and wide area networks.

17. My PhD dissertation at UC Irvine focused on empirical analyses of TCP/IP protocol stack implemented using a range of parallel message-based process architectures. These analyses measured the throughput, context switching, and synchronization exhibited by various process architectures on a shared memory multi-processor platform. The experimental results from my research quantified the extent to which the selection of a parallel process architecture affected the performance of TCP/IP protocol stacks. As a result of my expertise with TCP/IP, I served as a reviewer for W. Richard Stevens's books *TCP/IP Illustrated, Volume 1: The Protocols* and *TCP/IP Illustrated, Volume 2: The Implementation*, which were published in 1994 and 1995, respectively. These highly regarded books provide detailed coverage of the TCP/IP protocol stack specification, design, and implementation. My name appears in the Acknowledgements section of both books.

18. For the past three decades, my research has focused on distributed real-time and embedded (DRE) systems, which has yielded the ACE, Java ACE,

TAO, and CIAO middleware frameworks.<sup>1</sup> The millions of lines of object-oriented code in these frameworks provide layers of infrastructure and distribution middleware that simplify the development of concurrent and networked software apps and services. These middleware frameworks constitute some of the most successful examples of software research and development (R&D) ever transitioned from research to industry, being widely used by thousands of companies and agencies worldwide in many domains, including national defense and homeland security, datacom/telecom, financial services, healthcare, and online gaming.

19. In particular, my work on middleware for DRE systems has transitioned to the Joint Tactical Terminal (JTT) and Joint Tactical Radio System (JTRS) software defined radio programs, manned and unmanned combat air vehicles, the Orbital Express low earth orbit (LEO) satellite telemetry and control framework, the Ground Support System (GSS) for the X33 Single Stage To Orbit (SSTO) Reusable Launch Vehicle, and the USS Ronald Reagan and USS Zumwalt,

---

<sup>1</sup> See Obtaining ACE, TAO, CIAO, and DAnCE, Vanderbilt, <http://download.dre.vanderbilt.edu> (for access to ACE, TAO and CIAO downloads). See Java ACE, Vanderbilt, <http://www.dre.vanderbilt.edu/JACE> (for access to Java ACE downloads).

the USAF upgraded early warning radar system, as well as the Facebook iPhone app and electronic medical imaging systems from Siemens and GE, among many other governmental and commercial applications.

20. My research on DRE systems has been funded by a variety of organizations, including both federal agencies, such as DARPA, NSF, NASA, NIH, the U.S. Air Force, and the U.S. Navy, as well as leading companies, such as Northrup Grumman, Raytheon, Lockheed-Martin, Boeing, McDonnell-Douglas, General Electric, and Siemens. I have also received other honors and awards, including election to professional organizations, engagements for hundreds of invited talks, and the 2015 Award for Excellence in Teaching from the Vanderbilt University Department of Electrical Engineering and Computer Science.

21. In addition to my academic and research experience, from 2010 to 2014 I served as a member of the United States Air Force Scientific Advisory Board, where I was the Vice Chair of Cyber Situational Awareness, a study for the U.S. Air Force on the network security of mission operations. I have also served on the Advisory Board for the U.S. Naval Air Systems Command (NavAir) Future Airborne Capability Environment (FACE) and was a co-lead of a task force on “Published Open Interfaces and Standards” for the U.S. Navy’s Open Systems Architecture initiative.

22. Likewise, from 2000 to 2003 I served as a Deputy Office Director and Program Manager at the Defense Advanced Research Projects Agency (DARPA), where I led the national R&D effort on portable open system architecture middleware for distributed real-time and embedded (DRE) systems. During this time period I also co-chaired the Software Design and Productivity (SDP) Coordinating Group of the U.S. government's multi-agency Networking and Information Technology Research and Development (NITRD) Program, which helped to formulate the national interagency software research agenda.

23. My curriculum vitae, which includes a more detailed summary of my background and experience, is attached as Appendix B.

### **III. RELEVANT LEGAL STANDARDS**

24. I am not a lawyer and do not provide any legal opinions in this Declaration. Although I am not a lawyer, I have been informed and understand that certain legal standards are to be applied by technical experts in forming opinions regarding the meaning and validity of patent claims. I have been asked to provide my opinions regarding whether the claims of the '282 Patent are anticipated or would have been obvious to a person having ordinary skill in the art at the time of the alleged invention, in light of the prior art.

25. I have been informed and understand that a patent claim is not patentable under 35 U.S.C. § 103 if the differences between the patent claim and

the prior art are such that the claimed subject matter as a whole would have been obvious at the time the claimed invention was made to a POSITA. Obviousness, as I have been informed and understand, is based on the scope and content of the prior art, the differences between the prior art and the claim, the level of ordinary skill in the art, and, to the extent that they exist, certain objective indicia of non-obviousness.

26. I understand that objective indicia can be important evidence regarding whether a patent is obvious or nonobvious, if it has an appropriate nexus to the claimed invention, i.e., is a result of the merits of a claimed invention (rather than the result of design needs or market-pressure advertising or similar activities). Such indicia include: commercial success of products covered by the patent claims; a long-felt need for the invention; failed attempts by others to make the invention; copying of the invention by others in the field; unexpected results achieved by the invention as compared to the closest prior art; praise of the invention by the infringer or others in the field; the taking of licenses under the patent by others; expressions of surprise by experts and those skilled in the art at the making of the invention; and the patentee proceeded contrary to the accepted wisdom of the prior art.

27. I have been informed that whether there are any relevant differences between the prior art and the claimed invention is to be analyzed from the view of

a POSITA at the time of the invention. As such, my opinions below as to a POSITA are as of the time of the invention, even if not expressly stated as such; for example, even if stated in the present tense.

28. In analyzing the relevance of the differences between the claimed invention and the prior art, I have been informed that I must consider the impact, if any, of such differences on the obviousness or non-obviousness of the invention as a whole, not merely some portion of it. The POSITA faced with a problem is able to apply his or her experience and ability to solve the problem and also look to any available prior art to help solve the problem.

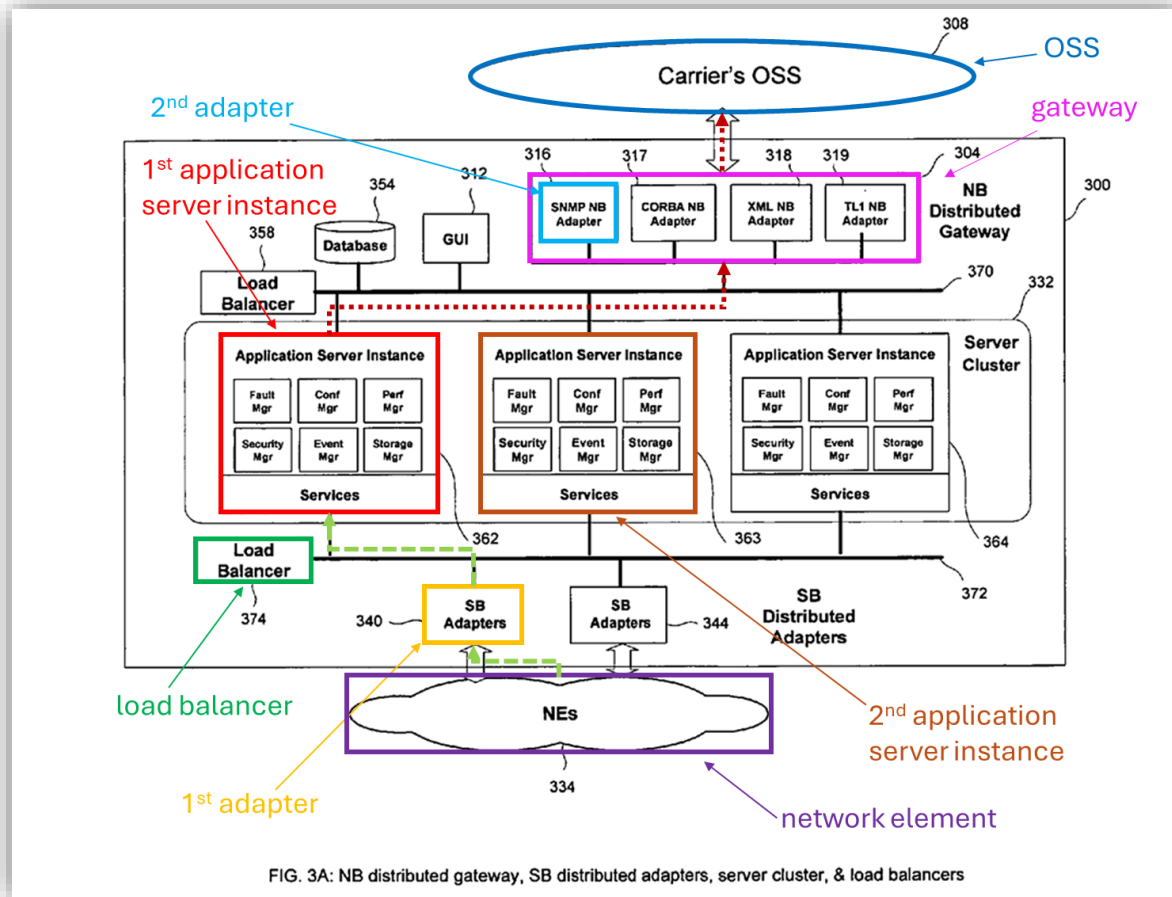
29. I have been informed that a precise teaching in the prior art directed to the subject matter of the claimed invention is not needed. I have been informed that one may consider the inferences and creative steps that a POSITA would have employed in reviewing the prior art at the time of the invention. For example, if the claimed invention combined elements known in the prior art and the combination yielded results that were predictable to a POSITA at the time of the invention, then this evidence would make it more likely that the claim was obvious. On the other hand, if the combination of known elements yielded unexpected or unpredictable results, or if the prior art teaches away from combining the known elements, then this evidence would make it more likely that the claim that successfully combined those elements was not obvious.

30. I have been informed and understand that there are recognized, exemplary, rationales for combining or modifying references to show obviousness of claimed subject matter. Some of the rationales include the following: combining prior art elements according to known methods to yield predictable results; simple substitution of one known element for another to yield predictable results; use of a known technique to improve a similar device (method or product) in the same way; applying a known technique to a known device (method or product) ready for improvement to yield predictable results; choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to a POSITA; and some teaching, suggestion, or motivation in the prior art that would have led a POSITA to modify the prior art reference or to combine prior art teachings to arrive at the claimed invention.

#### **IV. OVERVIEW**

31. The '282 Patent is directed to a distributed network management system ("NMS") in which communication adapters are distributed from the application servers of the NMS. The distributed architecture facilitates scalability in managing network elements and communicating information to network

administrators' operations support systems (OSS). FIG. 3A shows one example of an NMS, annotated relative to pertinent limitations of the Challenged Claims:



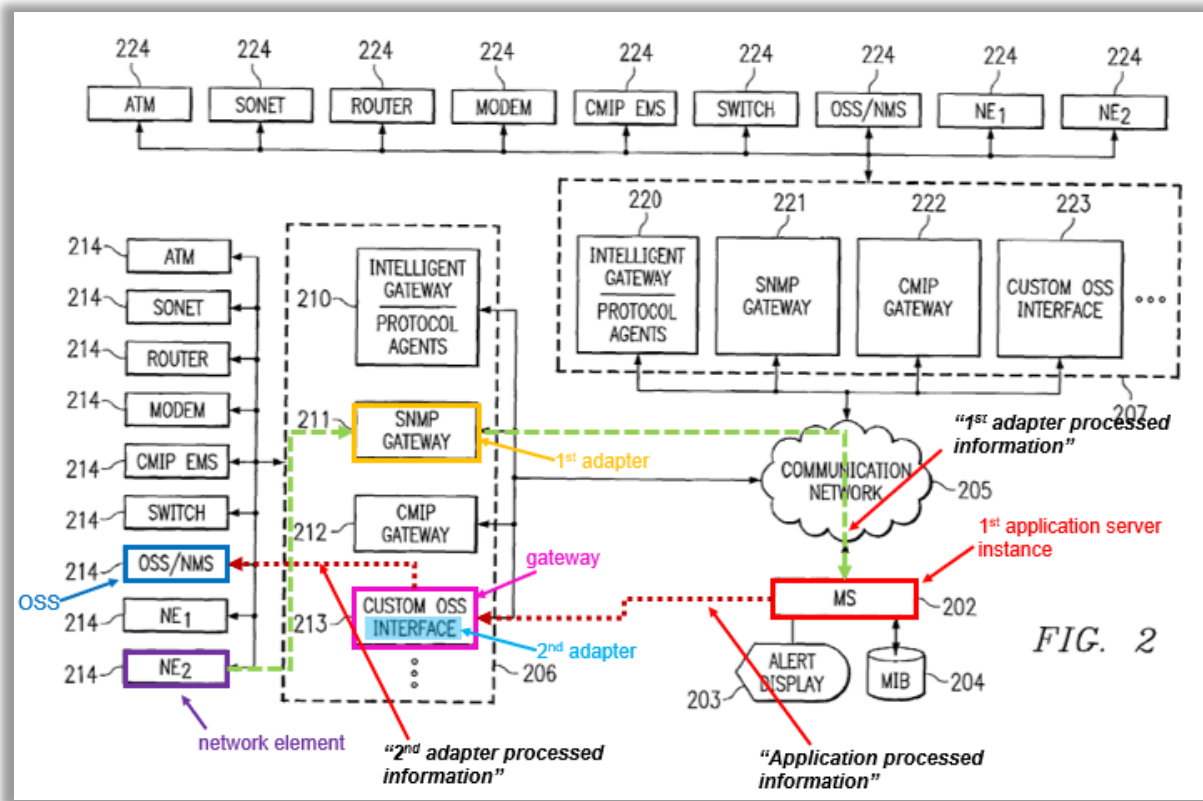
EX-1001 FIG. 3A (annotated).

32. Network elements (NEs) (purple), including any device or node on the network (such as a switch), provide management information (e.g., data, messages or events) to an application server (red) via an adapter (gold). The adapter facilitates transferring and translating between NEs and the application servers using one of any number of different protocols (dashed green arrow). A load balancer (green) uses any appropriate load balancing algorithm to distribute the

management information received by the adapter, from the NE, to one of the application servers of the cluster. The application server processes the information and transfers the processed information to a gateway (pink), which includes an adapter (light blue) that processes the information and translates and transfers the information to an OSS (blue) using one of any number of different protocols (dashed red arrow).

33. I have been informed that, during prosecution, the Applicant amended the claims to recite a “failover” feature (*see, e.g.,* [1d]) before allowance. The failover feature required that, in response to a first application server becoming disabled, an association is established between a second application server and the adapter and gateway that were previously associated with the first application server. However, such a failover feature was well known in the prior art as discussed in Ground 1 and §V (State-of-the-Art Section).

34. For example, *Secer* (EX-1004) disclosed a distributed NMS that includes a nearly identical architecture to the distributed NMS disclosed in the ’282 Patent that facilitates scalability in managing network elements and communicating information to network administrator’s operations support systems (OSS). FIG. 2 of *Secer* disclosed an NMS where elements in common with the ’282 Patent’s NMS are annotated in the same color used above:



EX-1004 FIG. 2 (annotated).

35. NEs (purple) provided management information including messages or events to an application server (*Secer's* management server MS 202) (red) via an adapter (*Secer's* "gateway") (gold) (dashed green arrow). *Secer's* adapters facilitated transferring and translating information between NEs and the application server using different types of protocols. The application server processed the information and transferred the information to a gateway (pink) (dashed red arrow). The gateway included an adapter (light blue) that processed the information and transferred and translated the information to an OSS (blue) using an appropriate protocol (dashed red arrow). *Secer's* NMS also used load

balancing and addressed failover. While *Secer* did not expressly disclose the use of multiple application server instances, and its load balancer and failover feature were expressly discussed for its gateways, failover and load balancing of multiple application servers was widely known and routinely implemented, as demonstrated by *Dinker* (EX-1005), as corroborated by the State-of-the-Art section (§V). For example, *Dinker* demonstrated that it was known to use load balancing and failover protection with distributed application server clusters. A POSITA would have found it obvious to extend *Secer*'s load balancing and failover concepts to *Secer*'s application server 202 following *Dinker*'s teachings of multiple application server clustering, load balancing, and failover protection teachings to achieve improved scalability, performance, efficiency, and fault-tolerance, as explained further in Ground 1 below.

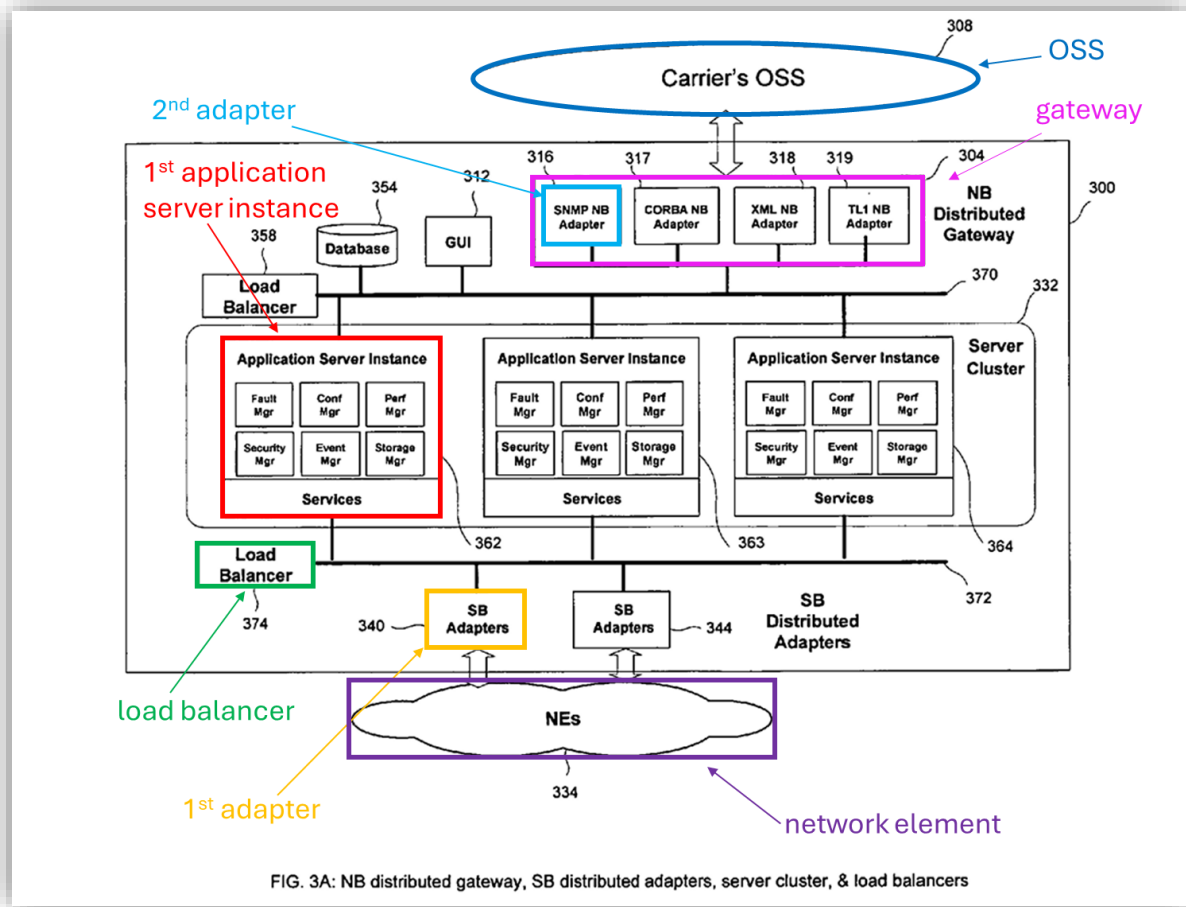
36. Thus, the Challenged Claims are obvious over *Secer* in view of *Dinker* as demonstrated by this Declaration and the evidence cited herein.

**A. Summary of the '282 Patent**

37. The '282 Patent is directed to a network management system (NMS). Network administrators conventionally use NMSs to facilitate the exchange of management information between Network Elements (NEs) and network administrators' Operations Support Systems (OSS) to, e.g., install, configure, and manage NEs. EX-1001 1:11-17.

38. The patent purported to provide a more robust and scalable NMS, capable of efficiently handling a growing network.

39. The '282 Patent discloses an example NMS 300 in FIG. 3A:



EX-1001 FIG. 3A (annotated). EX-1001 7:43-46. NMS 300 includes an application server instance (red), load balancer (green), southbound (SB) adapters (gold), “[northbound] NB gateway (gateway)” (pink) having an adapter (light blue) and OSS (blue). EX-1001 7:43-46.

40. The '282 Patent describes that, in one embodiment, NEs (purple) provide management information (e.g., traps/alarms) in the uplink (northbound)

direction to a southbound adapter (gold). The '282 Patent describes that adapters facilitate transferring and translating information between NEs, the application server(s) and OSS (blue) using different types of protocols. EX-1001 2:12-16; 2:53-61. The arriving information at the SB adapter is then transferred to a selected server (red) according to load balancer 374 (green). "Load balancer 374 may be a software module physically located on any device in NMS 300 and "may use any load balancing algorithm that is appropriate." For example, load balancer 374 may use a round robin scheme or distribute the load based on CPU usage. In some embodiments, all information from the SB adapter is passed to the selected server (red) for processing. The information is then transferred from the server to a selected NB gateway (pink). When the information arrives at the NB gateway, it is transferred to a NB adapter (light blue) that uses the NB interface protocol for communicating with the OSS (blue). The information is then transferred from the NB adapter to the OSS. EX-1001 9:1-24.

41. I have been informed that the '282 Patent claims were allowed after the addition of a "failover" feature (*see, e.g.*, [1d], §IV.B) where, in response to a first instance of the application server being disabled, a second application server instance gets associated with the software modules (e.g., gateways and adapters) that were associated with the disabled server. The '282 Patent provides sparse description of this "failover" feature:

An instance of the server can also be shut down for any reason without interrupting the server functionality as a whole. When a server is shutdown, its associated software modules (NB gateway 304, GUI 312, or SB adapters 340 or 344) automatically re-establish the association with another server instance (one of existing servers 362-364 or a standby server) based on certain criterion, such as selecting the lightest loaded server.

EX-1001 9:58-65. These two sentences do not include the technical details of how or why the application server may become disabled, nor do they include the technical details of how the software modules (gateway and adapter) are associated with the second application server instance. As the '282 Patent states: “technical material that is known in the technical fields related to the invention has not been described in detail so that the invention is not unnecessarily obscured.” EX-1001 2:8-11. As demonstrated below, it is not surprising that the '282 Patent does not include a detailed description of the “failover” feature because this feature was well known to a POSITA. §V.4; §VI.

42. Claim 1 is representative:

[1pre] *A method, comprising:*

[1ai] *receiving, at a first application server instance selected from a plurality of application server instances based on a load balancing process, first adapter processed information from a first adapter,*

[1a] wherein the first adapter processed information comprises event information received by the first adapter from a network element and processed by the first adapter based on a first communication protocol;

[1b] processing, by the first application server instance, the first adapter processed information based on an event management service to produce application processed information;

[1c] sending, by the first application server instance, the application processed information to a gateway device,

[1c] wherein the gateway device is one of a plurality of gateway devices respectively associated with the plurality of application server instances and is configured to transfer the application processed information to a second adapter of a plurality of second adapters configured to process the application processed information based on a second communication protocol to produce second adapter processed information and transfer the second adapter processed information to an operation support system device; and

[1d] in response to determining that the first application server instance has become disabled, facilitating establishing an association between the first adapter and a second application server instance of the plurality of application server instances and between the gateway device and the second application server instance.<sup>2</sup>

---

<sup>2</sup> This Declaration uses italics for language from the Challenged Claims.

43. As demonstrated below, the Challenged Claims, including the “failover” feature, are disclosed and/or rendered obvious by *Secer* in view of *Dinker*.

**B. Prosecution History of the '282 Patent**

44. I have been informed that the '282 Patent arose out of application 10/742,573, filed December 19, 2003. EX-1001 (21-22). I have also been informed that the '282 Patent was filed with 32 claims, including independent Claim 18 (which would be amended an ultimately issue as Claim 1):

18. A method of communicating in a network management system, including:  
communicating an event from a network element to a configured adapter wherein the configured adapter is preselected to handle events from the network element; and  
transferring information associated with the event from the configured adapter to an application server.

EX-1002, 0484-487, 0079.

45. I have been informed that following a series of rejections, claim amendments, and arguments, the applicant finally added the “failover” feature of limitation [1d] shown below, after which the Examiner allowed the claims, highlighting this limitation:

2. The Office deems Applicant's latest claim amendments persuasive to overcome the rejection of the claims over the applied prior art references and/or any other candidate prior art, and the claims are accordingly considered in condition for allowance (MPEP § 1302.14).

In addition, Applicants remark and/or argument that the current prior art references do not sufficiently teach or disclose *all* of the recited limitations of the amended independent claims, and claim 1 in particular, including the recited feature of “in response to determining that the first application server instance has become disabled, facilitating establishing an association between the first adapter and a second application server instance of the plurality of application server instances and between the gateway device and the second application server instance...” as recited [Remarks: par 2, pg. 9 & par 6, pg. 13], is also considered persuasive by the Office.

EX-1002, 0041.<sup>3</sup>

46. Again, it is my opinion that this tersely described “failover” feature (§V.4) was already well known. §§IV, V, VI.

### C. Claim Construction

47. I have been informed and understand that to properly evaluate the '282 Patent, the terms of the claims must first be interpreted.

---

<sup>3</sup> I have been informed that the Notice of Allowance incorrectly references “claim 1” and should reference claim 18, as claim 1 was canceled in a prior amendment in an Office Action response. EX-1002, 0308-313.

48. I have been instructed to give each claim term in the Challenged Claims its plain and ordinary meaning in this proceeding. It is my opinion that the prior art I have relied upon meets each of the claim terms under any reasonable construction. Thus, I understand that no specific construction of any claim term is required.

**D. Priority Date of Claims**

49. For the purpose of this *inter partes* review, I have been instructed to assume that the effective filing date of each of the Challenged Claims is no earlier than the filing date of U.S. Application 10/742,573, December 19, 2003. EX-1001 (21-22).

**E. Person of Ordinary Skill in the Art (POSITA)**

50. I am familiar with the knowledge and capabilities of a person of ordinary skill in the art (POSITA). Unless otherwise stated, my testimony below refers to the knowledge of a POSITA as of December 19, 2003, the earliest possible effective filing date of the '282 Patent.

51. I have been informed and understand that a Person of Ordinary Skill in the Art (“POSITA”) is a hypothetical person who is presumed to be aware of all pertinent prior art, thinks along conventional wisdom in the art, and is a person of ordinary creativity.

52. With respect to the '282 Patent, a POSITA in December 19, 2003 would have been someone knowledgeable and familiar with computer network management systems. A POSITA would have gained knowledge of these concepts through a mixture of training and work experience, such as by having at least a Bachelor's degree in electrical engineering, computer science, or related field, and at least two to three years of training or additional work experience in the domain of computer network management systems, or a related field. Additional hands-on and design experience could compensate for less formal education, and vice versa. The knowledge and skill of a POSITA is further reflected in the prior art references themselves, as well as the State of the Art (§V), discussed below.

53. I have been informed and understand that a POSITA may work as part of a multi-disciplinary team and draw upon not only his or her own skills but also take advantage of certain specialized skills of others on the team to solve a given problem.

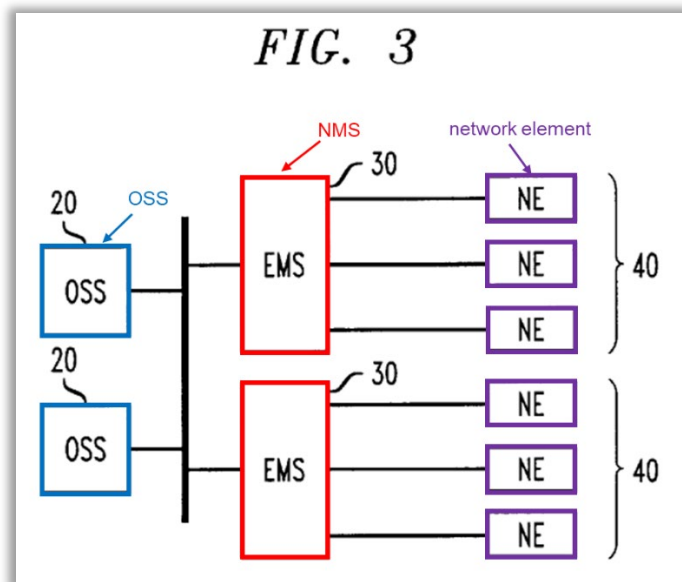
## **V. State of the Art**

54. This section describes the state of the art as of the Priority Date. This section, and the documentary evidence cited, provide additional factual support for my opinions regarding the general knowledge, common understanding and skill of a POSITA at the Priority Date. This section provides additional factual support and motivation to modify and combine the teachings of *Secer and Dinker*, and

further demonstrates why doing so would involve a reasonable expectation of success.

### 1. Network Management Systems/Operations Support Systems

55. By December 2003, network management systems (NMS) and operations support systems (OSS) were well known. For example, U.S. 6,718,377 (“*Bischoff*,” EX-1008) disclosed that OSSs allowed users to “efficiently and effectively manage (i.e., monitor, regulate, configure, etc.)” network elements. EX-1008 1:17-26; *see also* EX-1014 ¶77 (OSS functionality included “network management” functions). The OSS (blue) controlled, monitored, managed, maintained, and performed the functions that kept the network operating efficiently:



EX-1008 1:24-30, FIG. 3 (annotated). OSSs “typically” interfaced with other components to manage NEs, e.g., the element management systems (EMSs) (red)

shown above. EX-1008 1:44-46. *Bischoff* disclosed the EMS in connection with the management and administration of one or more NEs. EX-1008 1:29-31. *Bischoff* further disclosed communications between the OSS and EMS used the Common Object Request Broker Architecture (CORBA) protocol. EX-1008 4:63-67. Thus, the EMS performed network management tasks and acted as an intermediary between the OSS and NEs. Moreover, it was known to use an OSS in the management of NEs using components between the OSS and the managed NEs.

56. As another example, U.S. 5,742,762 (“*Scholl*,” EX-1009) disclosed that “traditional network management service applications” existed by December 2003:

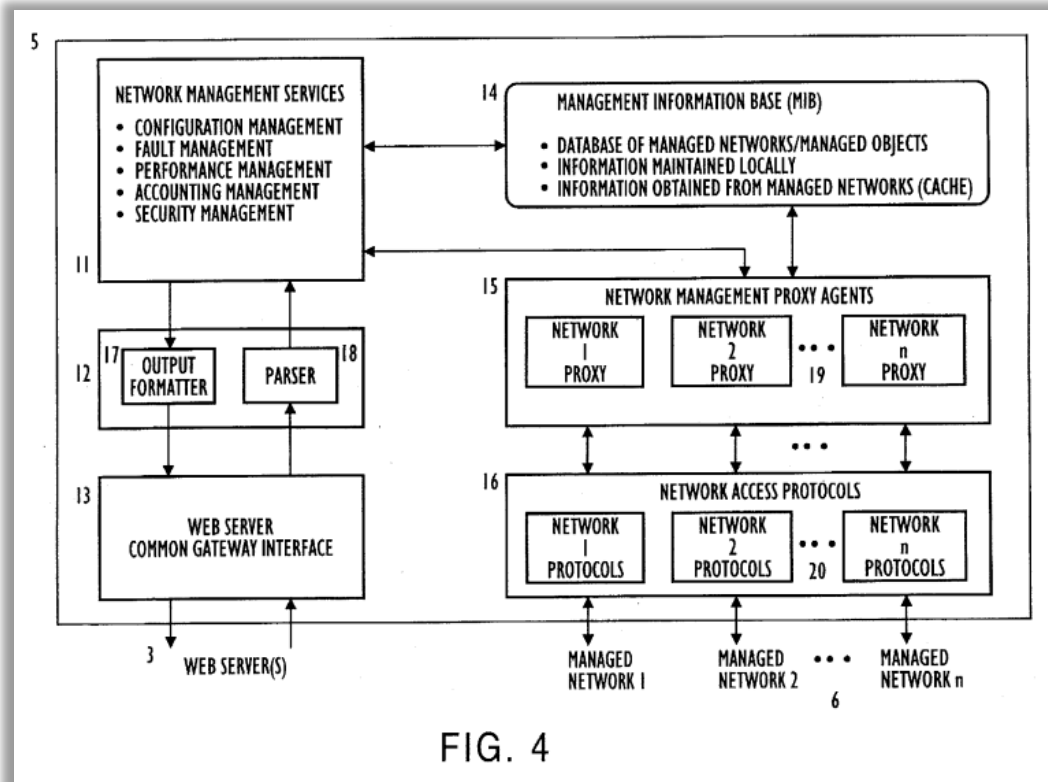
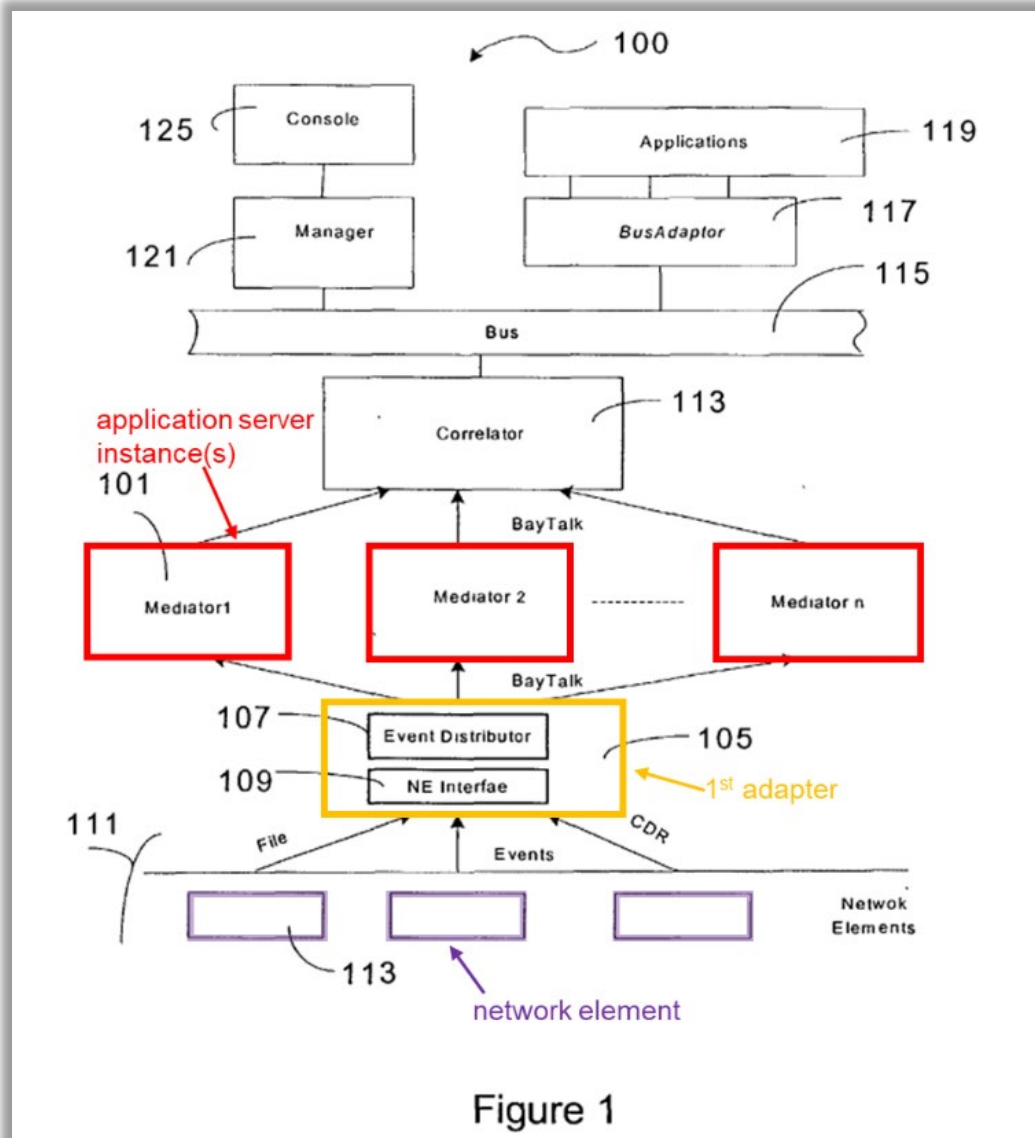


FIG. 4

EX-1009 9:1-12, FIG. 4. As shown above, the network management service applications included “configuration management” that tracked network configuration from remote locations, fault management (isolating, diagnosing, resolving and logging network problems), and performance management (optimization of network performance through data collection and analysis). EX-1009 9:1-12, FIG. 4. Scholl further acknowledged the use of the simple network management protocol (SNMP) as a standard “network management protocol.” EX-1009 3:49-54.

57. It was also known to use NMSs that monitored elements using the same architecture described in the '282 Patent. For example, U.S. Patent Pub. No. 2004/0008717 (“Verma,” EX-1012) depicted distributed application servers called

“mediators” (red) that received messages and events from network elements (purple):



EX-1012 FIG. 1 (annotated); cf. EX-1001 FIG. 3A:

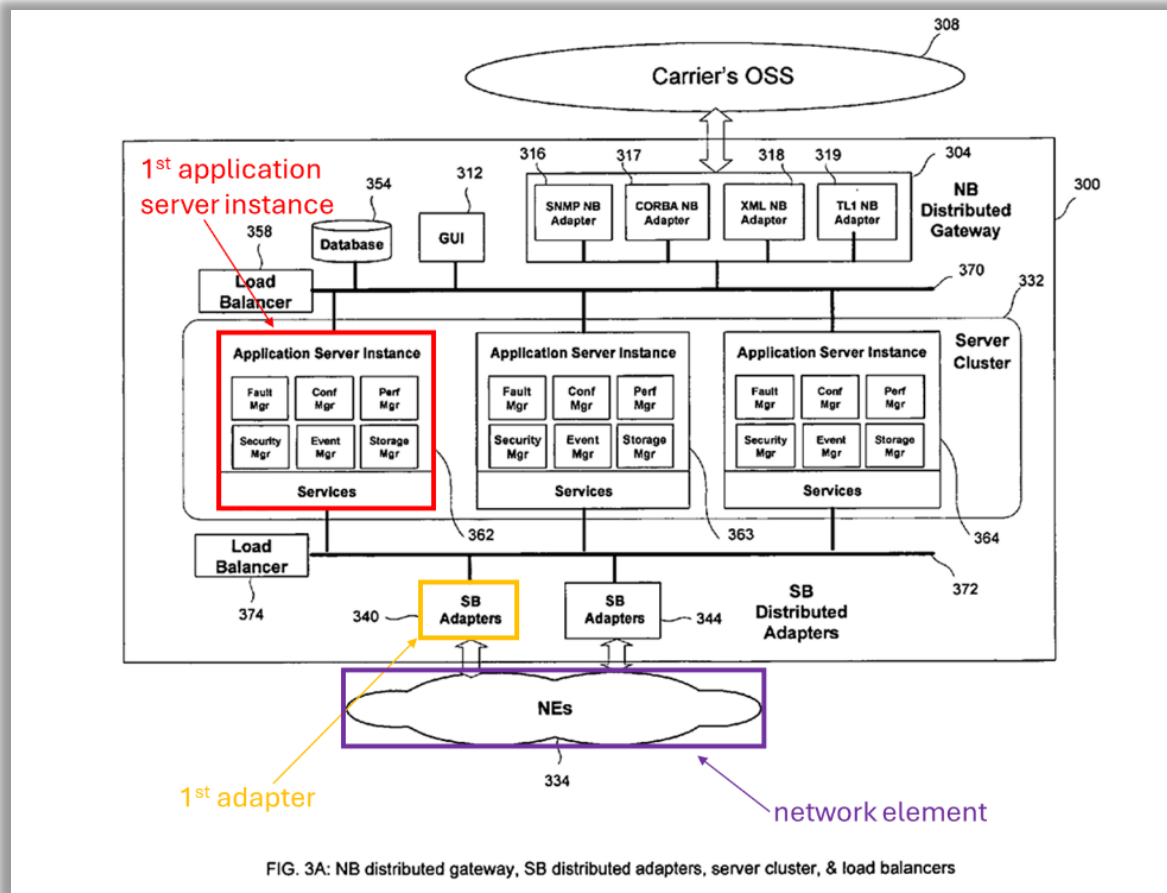


FIG. 3A: NB distributed gateway, SB distributed adapters, server cluster, & load balancers

58. Each of the distributed application servers (red) monitored network activity or events through an adaptor (gold), which included a distributor 107 and an interface 109. The adaptor received event information, which may be in different formats, from the network elements (purple), converted the information into a common protocol, and sent the converted event information to one of the application server instances. EX-1012 ¶30. The application server processed (e.g., converted) events are fed by application servers to different operation and support systems (OSS) after doing necessary correlation/filtering and formatting as per the OSS (blue) requirements via one of a plurality of correlators (BC)(pink):

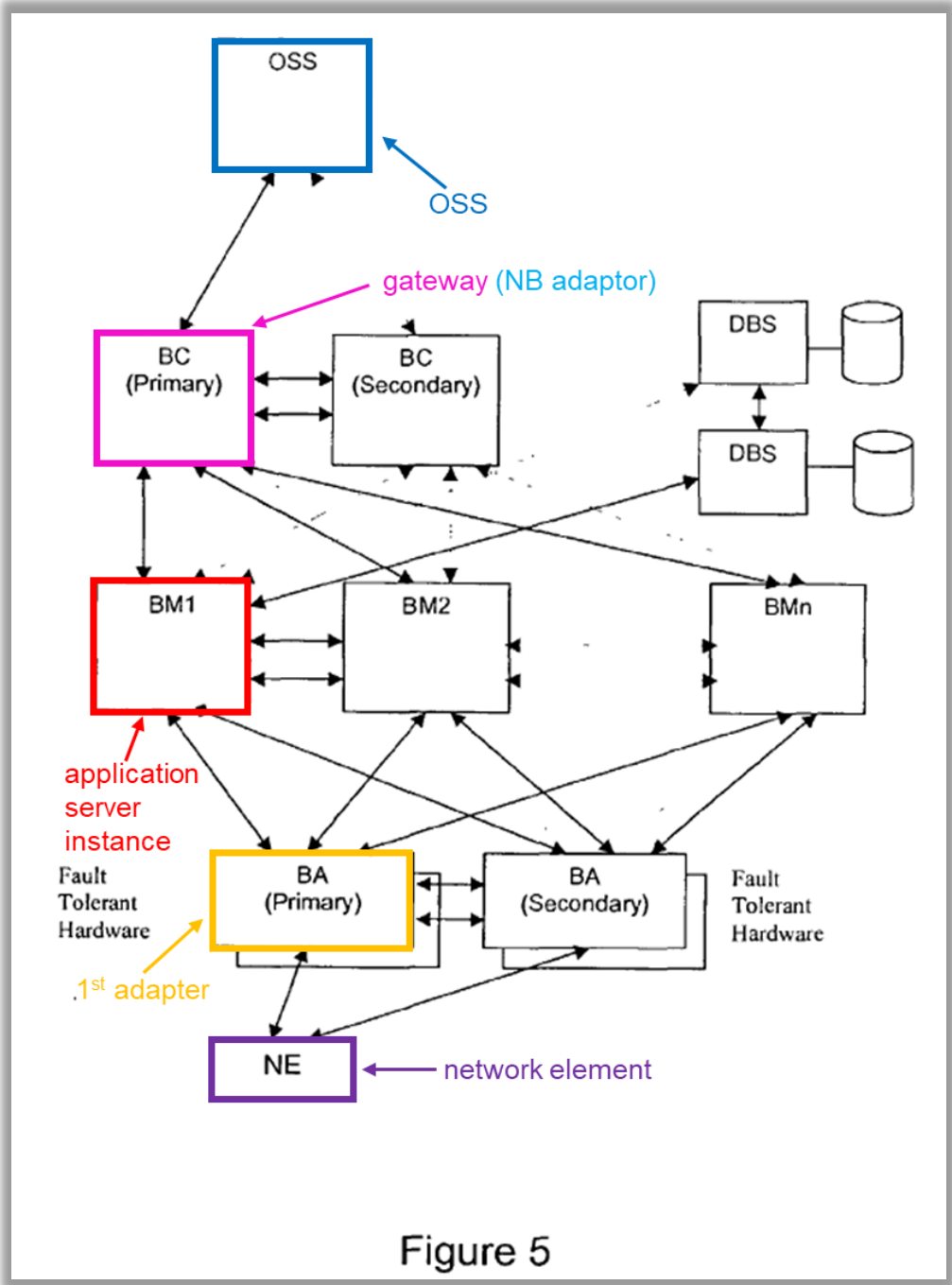


Figure 5

EX-1012 ¶¶18, 32, FIG. 5 (annotated). *Verma* stated that having an adaptor “interfac[ing] with the network elements and distribut[ing] the events to one or more mediator[s],” i.e., distributed applications servers, “support[ed] higher traffic,

“ma[de] the system scalable,” and improved reliability in case of server failures. EX-1012 ¶¶17, 31 79. In other words, it was known to add more application servers to handle more traffic and further improve fault tolerance. *Id.*

## 2. Adapters

59. Adapters were well known by December 2003. For example, *Verma* disclosed adapters were well known and stated, “[t]he adaptor receives events, which may be in different formats, from the network and converts them into a common protocol” for the “mediator systems.” EX-1012 ¶30. Indeed, *Verma* emphasized the use of the common protocol for adapter-mediator communications, stating that it was preferable. EX-1012 ¶77. The adapters also formed part of a “scalable, fault tolerant” system. EX-1012 ¶17.

60. As another example, U.S. Patent 6,260,062 (“*Davis*,” EX-1013) disclosed adapters that “translated” network management messages and network element-dependent protocol messages “into a common element-independent message protocol, as known to one of skill in the art.” EX-1013 13:39-43, 15:19-22. *Davis* further disclosed that its adapters served “network elements” (purple) “of different types and different manufacturers.” EX-1013 13: 55-60. *Davis* disclosed that its adapters supported the management of “very large, heterogenous telecommunications networks and support[ed] rapid, low-cost integration of new

and different network element types having a variety of protocols and a variety of manufacturers.” EX-1013 5:11-16.

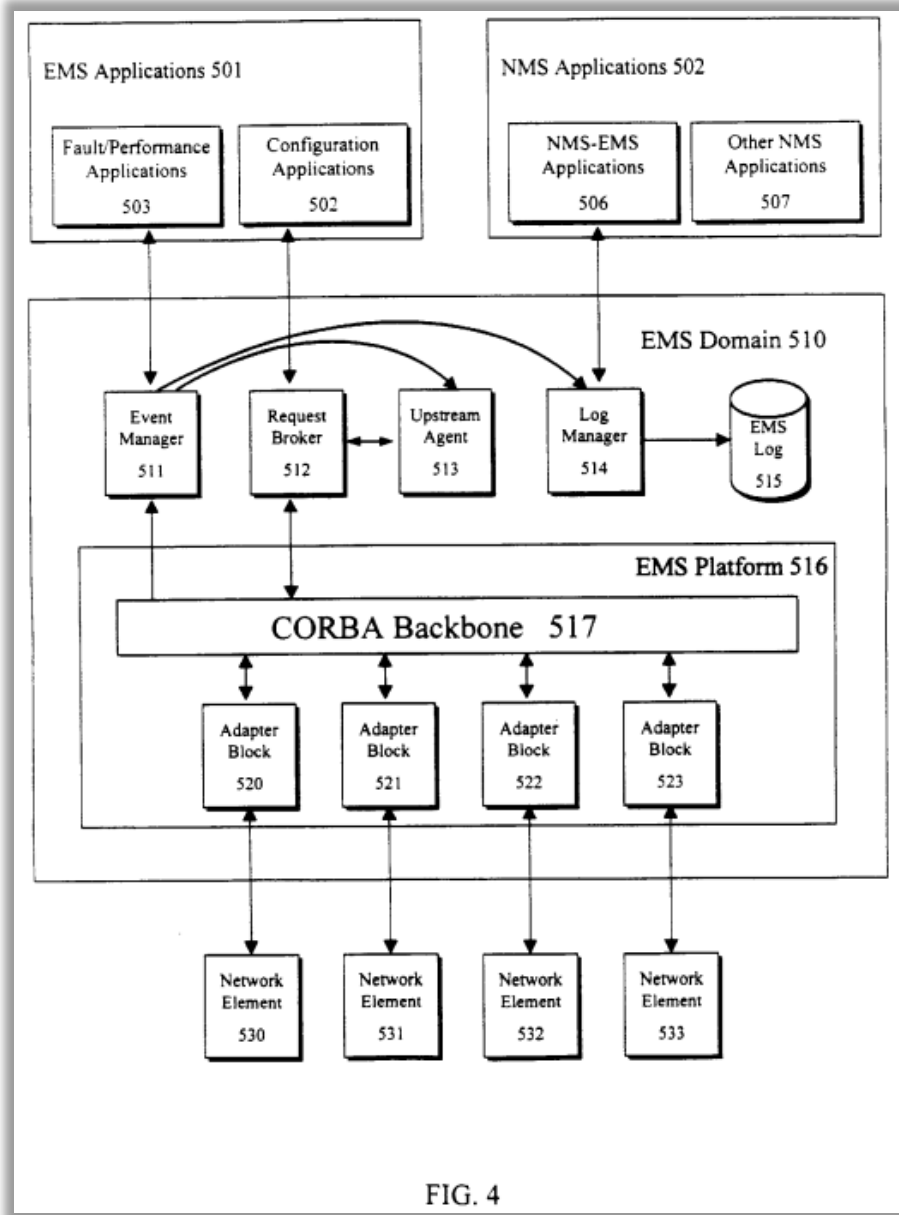


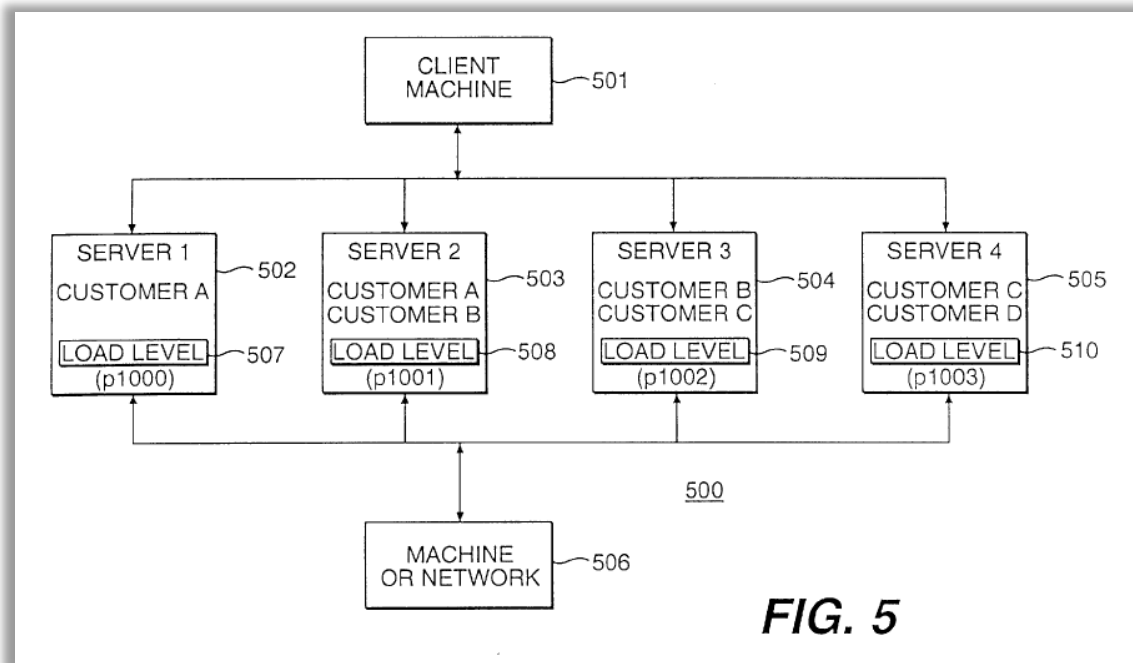
FIG. 4

EX-1013 FIG. 4.

### 3. Load Balancing

61. By December 2003, load balancing, including, specifically, among distributed application servers, was well known. For example, in *Verma's* NMS, the adapter forwarded the events to one of the distributed mediators (application servers) “evenly” or “based on load.” EX-1012 ¶¶31, 33 (“The mediator systems receive distributed events based on load to each of the mediator systems.”) 42 (adapters load balanced). *Verma* explained that **distributing the load evenly to the application servers “save[d] costs” and avoided congestion.** EX-1012 ¶31, 42. Thus, load balancing and its benefits were known in the context of NMS application servers.

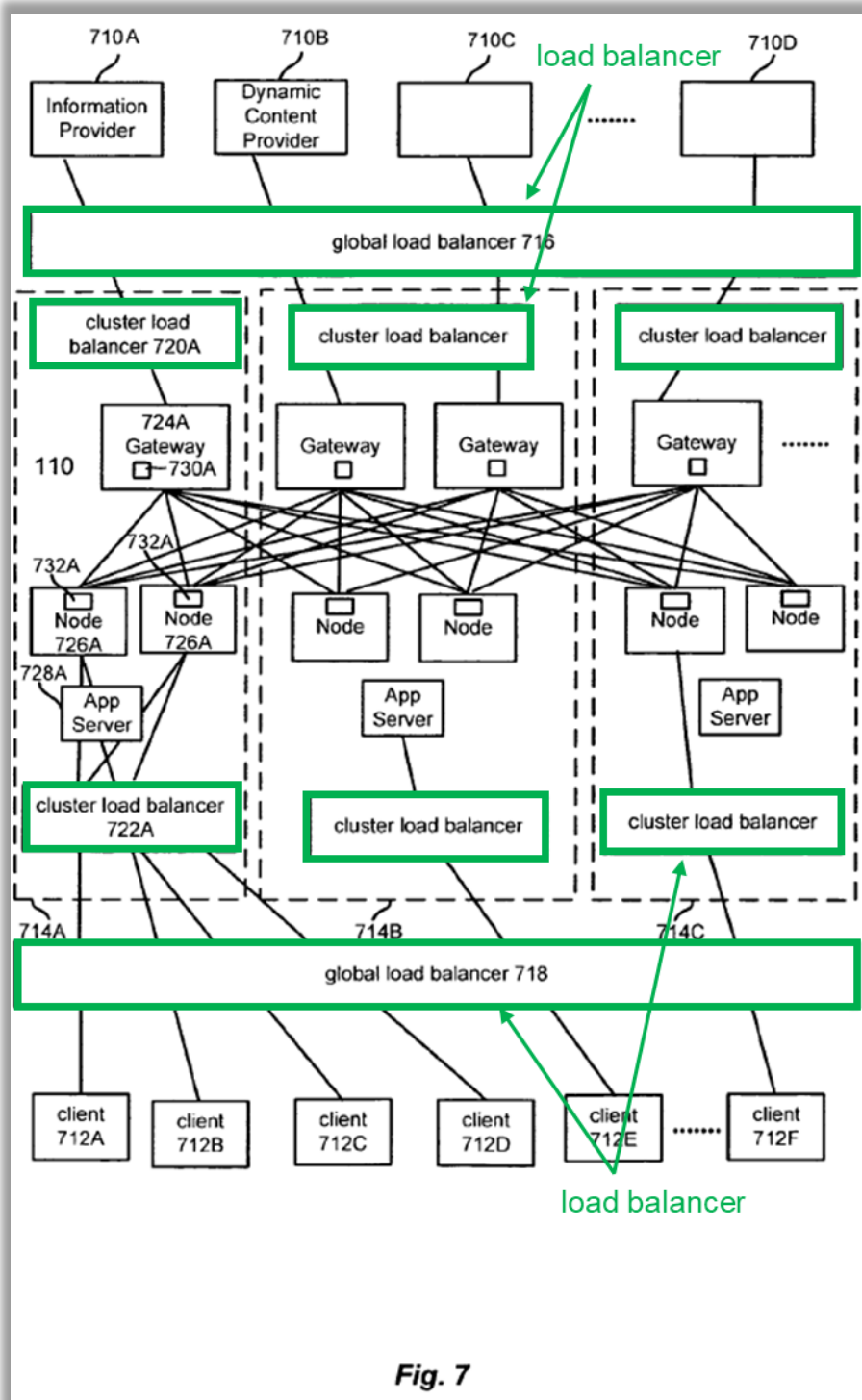
62. By way of another example, U.S. Patent No. 6,470,394 (“*Bamforth*,” EX-1011), expressly described that load balancing of distributed servers was important. *Bamforth* depicted a multi-application server environment:



EX-1011 FIG. 5. *Bamforth* stated that “[b]alancing the customer load among the servers is important, for example, to maintain service to the customers and avoid downtime.” EX-1011 8:15-20.<sup>4</sup> *Bamforth* further disclosed that “the load balancing achieved by [its] servers ... may be used in any applicable computer network for any applicable processing.” EX-1011 9:1-4.

63. Moreover, the mechanisms for load balancing were well known, amounting to routine skill in the art. For example, U.S. Patent No. 7,043,525 (“*Tuttle*,” EX-1010) disclosed that load balancers (green) for application server clusters were well known. EX-1010 15:16-16:21. *Tuttle* disclosed a “cluster load balancer”:

<sup>4</sup> Unless stated otherwise, all emphasis in this Declaration is added.

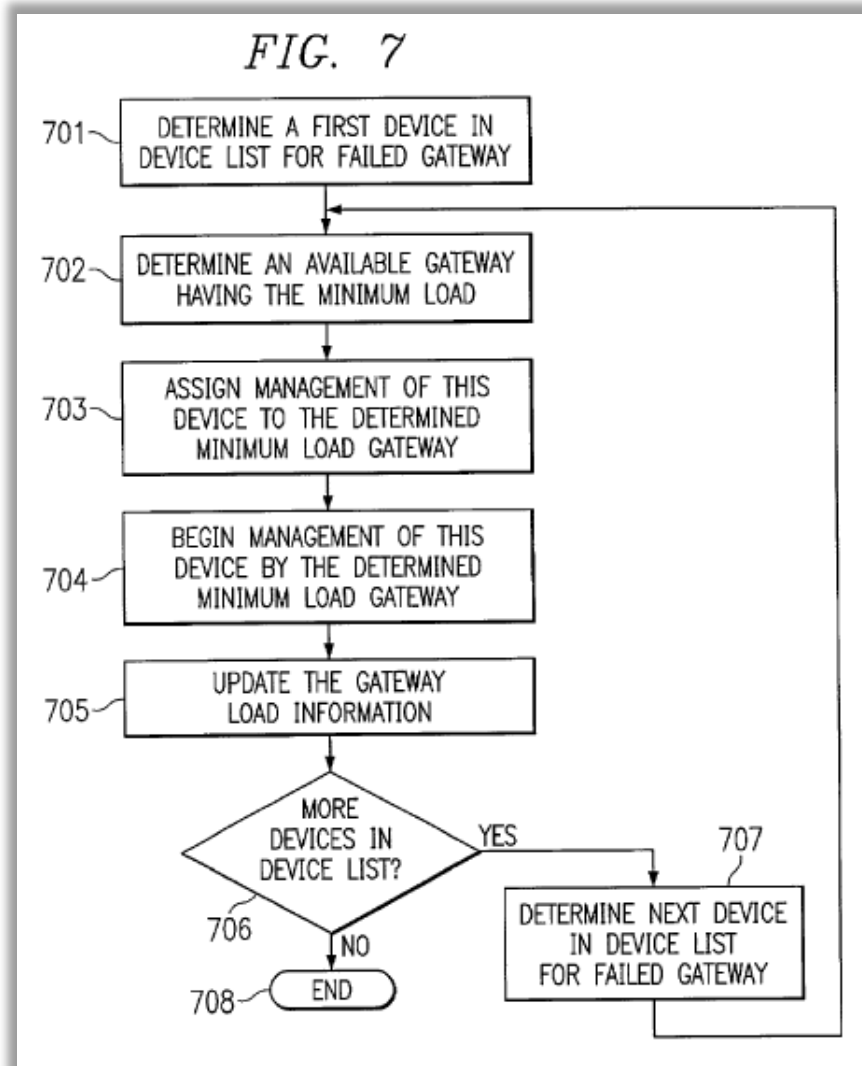


EX-1010 FIG. 7 (annotated). *Tuttle* explained that load balancers 716, 718 were designed to ensure that the load was distributed among the clusters 714A-714C.

For example, the load may be distributed evenly among the clusters 714A-714C or a more powerful cluster may be distributed a majority of the load. EX-1010 15:35-40, 16:4-11. *Tuttle* further disclosed cluster load balancers 720A, 722A which distributed messages once received within the cluster 714. EX-1010 15:44-53.

64. As another example, WIPO Publication WO 00/08823 (“*Keene*,” EX-1006) stated that load balancing across a multitude of servers lessens the work required by a single server and “**effectively speeds the response of the system.**” EX-1006 5:8-20.

65. In a further example, *Secer* disclosed “various types of **load balancing algorithms** may be utilized” in an NMS. EX-1004 17:1-3. One of these ways *Secer* disclosed load balancing was to find “an available **gateway having the minimum load is determined,**” and then assign work to that gateway:



EX-1004 FIG. 7, 17:9-18.

66. Thus, a POSITA was well-aware of various ways of implementing load balancing for application servers, including NMS application servers.

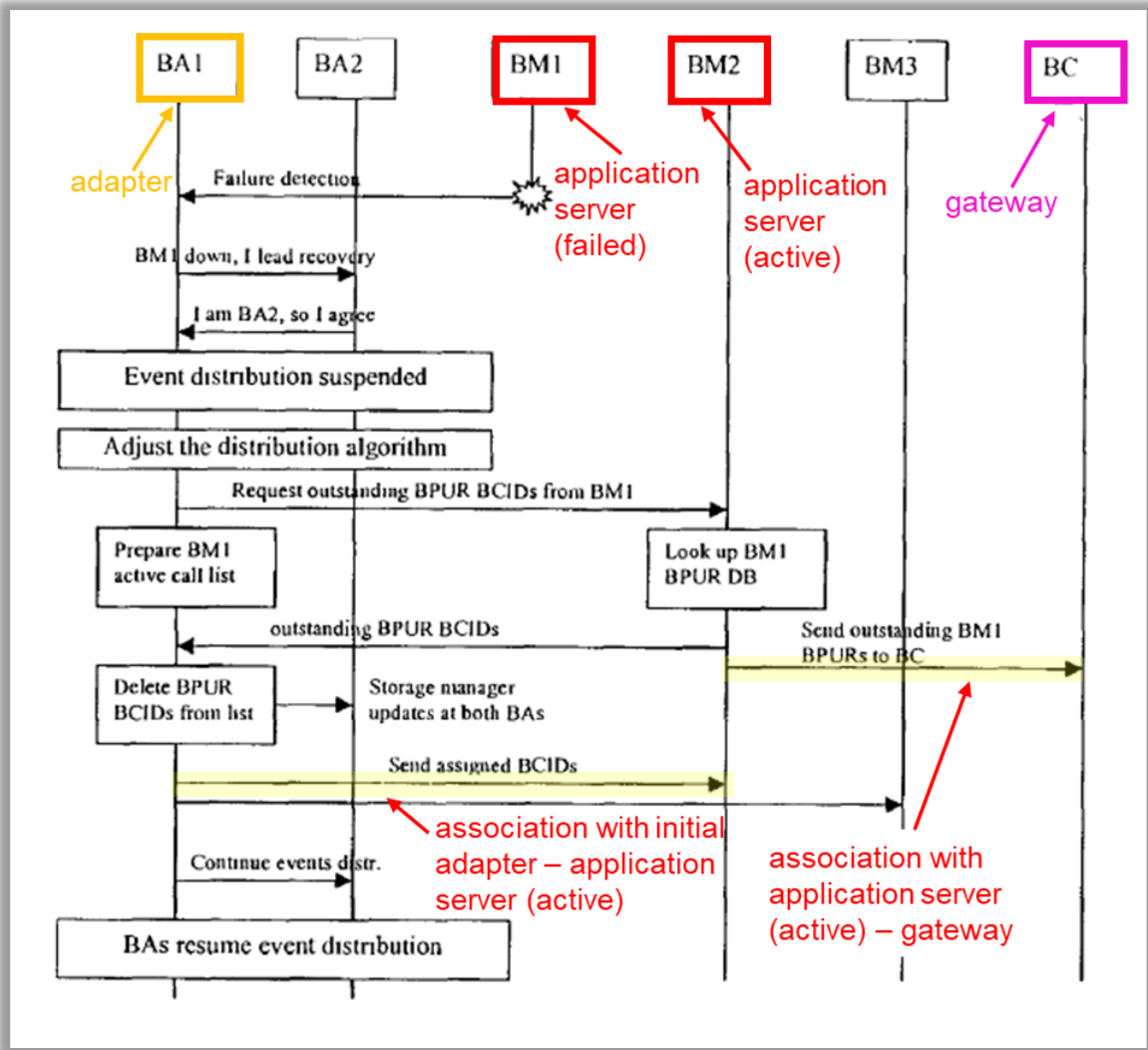
#### 4. Failover and Recovery

67. Failover and recovery techniques were well known by December 2003. For example, *Verma* disclosed a fault tolerant NMS. EX-1012 Abstract. *Verma* expressly disclosed that, if an application server (*Verma's* mediator) failed,

*Verma*'s adaptor redistributed event information, collected from the NEs, from the failed application server to another application server. EX-1012 ¶31.

68. Unlike the '282 Patent, *Verma* disclosed at least one detailed example of how to detect failure and perform recovery of an NMS application server, demonstrating the knowledge and skill in the art at the time of the purported invention. *Id.* at ¶81. For example, *Verma* disclosed that an adaptor could detect the failure based on loss of "heartbeat signals" transmitted from the application server. *Id.* at ¶81. The adapter detecting the failed application server would then inform it will lead the recovery process. *Id.* at ¶81. The adapter suspended the event distribution activity and adjusted the distribution algorithm as per the predefined policy so as not to send events to the failed application server (*i.e.*, load balanced). *Id.* at ¶81. The adapter prepared a list of events which were active at the time the application server failed and divided this list, and sent sending the events to other application servers based on the current load of the application servers. *Id.* at ¶81. This ensured that the events, which were being processed by the failed application server, were distributed to active mediators (application servers) based on their current load. *Id.* at ¶81. Thus, *Verma* disclosed an exemplary system having improved fault tolerance and reliability in case of application server failures. EX-1012 ¶¶17, 31, 79, 81.

69. *Verma* disclosed its failure recovery process in FIG. 6:



EX-1012 FIG. 6 (annotated). As shown, during the recovery process and after detecting the failed application server, an association between the adapter (“BA1”), which processed network element events and was associated with the failed application server (“BM1”), was established with the active application server (“BM2”), and the association with the gateway (BC) was established with the active application server (“BM2”). EX-1012 ¶81, FIG. 6.

70. It is my opinion that a POSITA understood that establishing associations with the adapter and gateway that were associated with the failed application server, as exemplified in *Verma's* disclosure, simplified the recovery process compared to establishing new associations with a different adapter and gateway. EX-1012 ¶¶81, FIG. 6. The adapter and gateway that initially serviced the NEs used one protocol while the other adapters and gateways used different protocols. EX-1012 ¶¶31-32, 51-52. Instead of searching for a new adapter and gateway that used the same protocols, the same adapter and gateway would be associated with the new application server. EX-1012 ¶¶81, FIG. 6. This would save time and computing resources by eliminating the need to search for a new adapter or gateway and forego the associations between the new adapter and the NE, and the new gateway and OSS. Additionally, the geographic location between the initial adapter and gateway likely would have been selected based on having a minimal distance to the NEs and OSS, respectively, in order to reduce network traffic and latency within the network, and thus a POSITA understood it would be beneficial to use the initial adapter and gateway with a replacement application server to maintain these benefits. EX-1004 17:67-18:11; EX-1012 ¶¶81.

71. Likewise, *Dinker* confirmed that failover techniques used in application server clusters were well known and desirable:

In computer systems, “failover” refers to a backup operational mode in which the functions of a system component (such as a processor, server, network, or database, for example) are assumed by secondary system components when the primary component becomes unavailable through either failure or scheduled down time. It would be **desirable to provide** various types of **failover mechanisms to** increase the fault-tolerance of **an application server cluster**.

EX-1005 ¶33, Abstract, ¶¶ 2, 34, 57.

72. *Keene* (EX-1006) is yet another example showing failover systems and techniques were well known: “When a system fails, the **remaining available systems take over the failed system’s load.**” EX-1006 1:17-21. *Keene* further confirmed the widely-understood, benefit of fault tolerance: “The ability of a peer group to allocate work amongst available servers, and **then reallocate work if a particular server should become unavailable, provides fault tolerance.**” EX-1006 5:19-22.

73. U.S. Patent Pub. No. 2003/0028654 (“*Abjanic*,” EX-1007) is yet another example that further confirmed how well-known failover systems, including for servers, and their obvious benefits were to a POSITA:

[A] program may detect the **failure of one or more servers...and then... account for these changes in the network (e.g., **redirect certain messages...from servers which have failed to the available servers**).**

EX-1007 ¶47.

## **VI. IDENTIFICATION OF HOW THE CLAIMS ARE UNPATENTABLE**

### **A. Ground 1: Claims 1-22 Are Obvious over *Secer* in View of *Dinker***

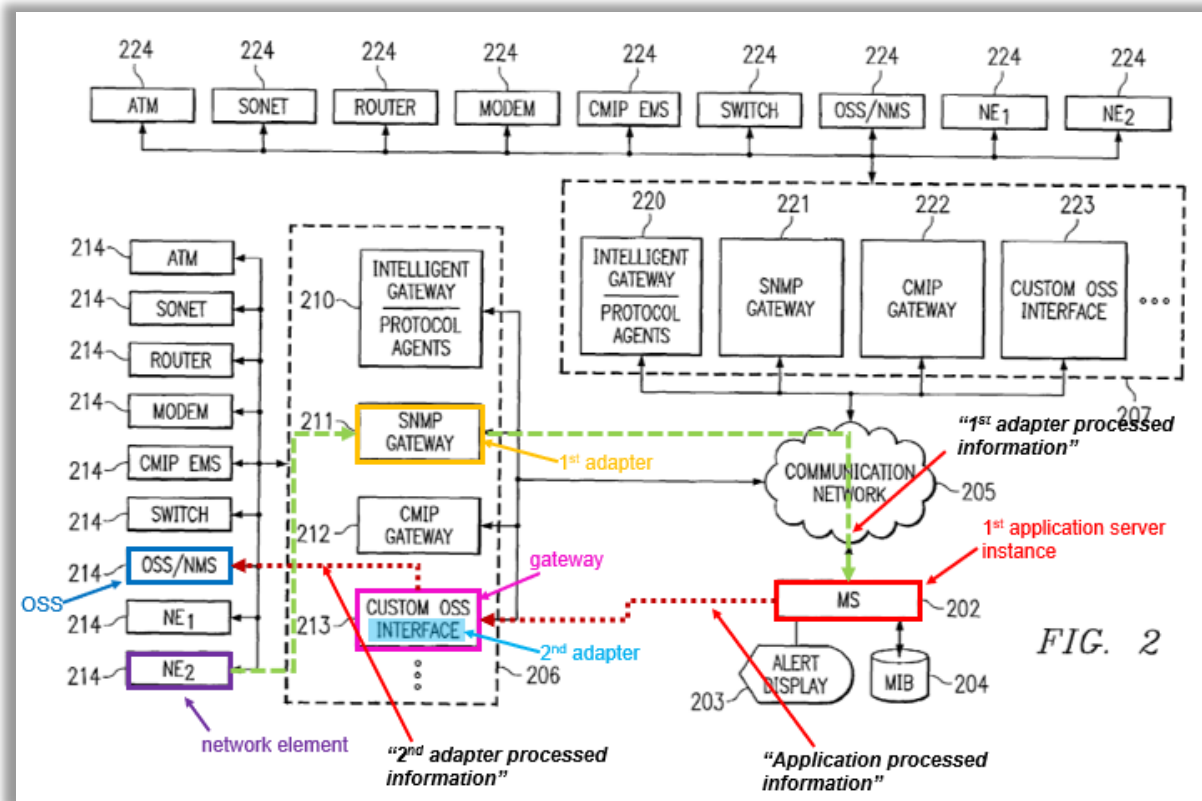
#### **1. *Secer* (EX-1004)**

74. U.S. Patent No. 7,209,968 to *Secer* (“*Secer*,” EX-1004) is directed to a “System and Method for Recovering Management of Network Element(s) Responsive to Failure of a Distributed Gateway.” EX-1004 (10), (45), (75), (54). I have been informed that *Secer* qualifies as prior art and was not before the Examiner during prosecution of the ’282 Patent. EX-1002.

75. *Secer* disclosed a system and method for efficient recovery of the management of NEs responsive to the failure of a distributed “gateway” coupled between the NEs and a central management system. EX-1004 Title, 1:25-31, Abstract.

76. *Secer* acknowledged that “legacy management systems,” including NMS and OSSs, managed networks and NEs and “commonly recognize[d] faults (or traps)” from the network and/or polled NEs. EX-1004 1:52-60, 2:15-35. *Secer* explained that the prior art management systems faced challenges recovering from failures, resulting in the loss of “many messages (or events)” from NEs, stating that prior NMS “often fail[ed] to efficiently resolve the failure.” EX-1004 7:30-47.

77. *Secer* illustrated an NMS for addressing these issues:



EX-1004 FIG. 2 (annotated); see also FIGs 3-6 (providing additional detail).

Specifically, *Secer* disclosed a central management system (MS) 202 (*first application server instance*) (red) comprising a server for network management that received data from *network elements* 214 (purple) collected by “gateway group 206” containing “gateways” 210-213. EX-1004, 9:17-18. *Secer* further disclosed that each gateway 210-213 (*first adapter*) (gold) could facilitate communication (*i.e.*, processing, filtering, translating, etc. communications and data) between MS 202 and network elements 214 using different communication protocols. EX-1004 9:17-16. For example, the gateway 211 processed and converted communications from SNMP-based devices. EX-1004 1:64-2:8, 8:60-9:18, FIG. 2. These

communications include messaging, events, and polling information received at the gateway. EX-1004, 9:13-26. Therefore, the gateways (each a *first adapter*) processed communications from network elements, converted the communications to the correct protocol, and sent the converted communication to central MS 202 for further processing. EX-1004 9:22-25.

78. *Secer* disclosed that the MS (*application server instance*) used various software applications to process messages and polling information received from the gateways to pull “management behavior objects” that controlled the behavior of the gateways and NEs. EX-1004 9:26-10:11. For example, the “management behavior objects” described the operation(s) to be performed by a gateway(s) in response to various messages from the network elements. EX-1004 9:62-10:4.

79. *Secer* described that the MS identified and pushed the management behavior object to the “appropriate gateways”. EX-1004 10:4-11. *Secer* also disclosed that gateways 210-213 included functionality to recognize and process different protocols. EX-1004 2:29-35; 9:3-16. *Secer* also disclosed that the gateways included functionality for fault management and performance management. EX-1004 2:62-3:17; 10:12-30.

80. *Secer* disclosed that gateway 213 (pink) included the particular protocols for communicating with OSS 214 (blue) using a custom OSS interface gateway 213 (light blue). EX-1004 9:3-16. When a management behavior object

identified, e.g., OSS 214, the management behavior object(s) for OSS 214 would be sent to gateway 213 (pink) for processing using the custom OSS interface protocol (second adapter) (light blue) to be sent from custom OSS interface gateway 213 to OSS 214 (blue).

81. *Secer* also disclosed enabling efficient recovery of the management of NEs responsive to a failure of a managing gateway. EX-1004 4:7-21; 10:12-30. Specifically, *Secer* disclosed monitoring the operation of distributed gateways that managed NEs. EX-1004 4:7-21; 10:31-52; FIG 3, FIG 4 (monitor 401, 402), FIG 6 (monitor 603, 604). Through such monitoring, failure of one of the distributed gateways may be efficiently detected, and management of the affected NEs may be efficiently recovered by assigning management responsibility to another distributed gateway. EX-1004 4:7-21. While the details of this failover mechanism were expressly described with respect to gateways, *Secer* stated that “the detection and recovery techniques described herein may be utilized within any client/server environment and may be applied to devices other than gateways.” EX-1004 18:12-15. Thus, a POSITA understood that *Secer* would be readily improved by extending failover techniques to other components, including its MS. EX-1004 18:12-28.

## 2. *Dinker* (EX-1005)

82. U.S. Patent Publication No. 2003/0177411 to *Dinker* et al. (“*Dinker*,” EX-1005) is titled “A System and Method for Enabling Failover for an Application Server Cluster.” EX-1005 (10), (12), (54), Title. I have been informed that *Dinker* qualifies as prior art and was not before the Examiner during prosecution of the ’282 Patent. EX-1002.

83. *Dinker* was directed to managing application server clusters, including “failover for an application server cluster.” EX-1005 Title, ¶2. For example, *Dinker*’s application server cluster included application servers 108A, 108B (each an *application server instance*) (red) and a broker/web server 104 that load balanced its client requests among the servers of the cluster (*load balancer*) (green):

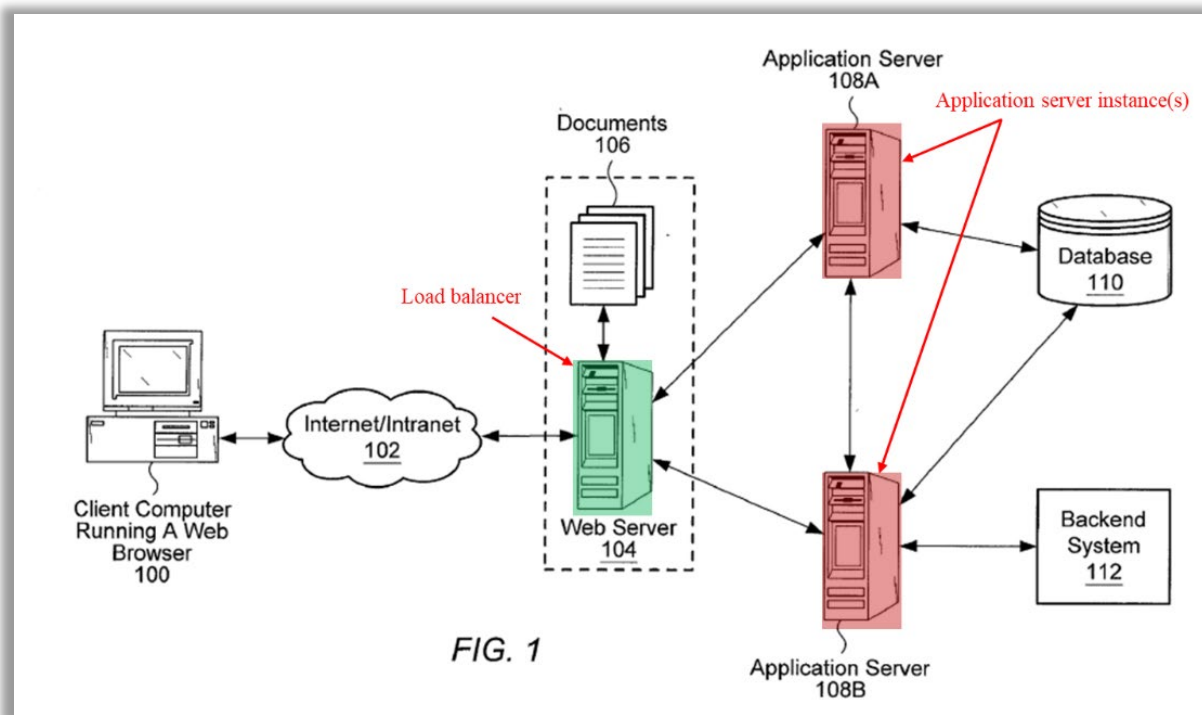


FIG. 1

EX-1005 FIG. 1 (annotated). *Dinker's* Web Server 104 (*load balancer, load balancing component*) was coupled to a plurality of application servers and selected an application server (*application server instance*) from the server cluster using “load balancing techniques.” EX-1005 ¶49.

84. *Dinker* further disclosed various failover procedures for the server clusters, including a “backup operational mode in which the functions of a system component (such as a processor, **server**, network, or database, for example), are assumed by secondary system components when the primary component becomes unavailable through either failure or scheduled down time.” EX-1005 ¶33. Thus, *Dinker* disclosed the well-known application server clustering, load balancing and

failover and their well-known benefits of improved scalability, fault tolerance and improved reliability. §V.4.

### 3. Motivation to Combine *Secer* and *Dinker*

85. *Secer* disclosed a single application server in its distributed NMS, with load balanced and failover for its gateways. A POSITA would have found it obvious to extend *Secer*'s load balancing and failover concepts to its application server following *Dinker*'s teachings of application server clustering that used load balancing and failover, for several reasons.

86. **First**, it is my opinion that *Secer* and *Dinker* are analogous art. *Secer* is in the same field of endeavor as the '282 Patent because it is directed to managing NEs, including for fault detection and performance management of the same, using an NMS having distributed network components to increase the efficiency, including during recovery from failures network-management components. EX-1004 1:25-35. *Secer* is reasonably pertinent to the problem addressed by the '282 Patent's claimed invention because *Secer*'s solution detailed distributing network-management components (e.g., adapters) and implementing failover techniques for the same. EX-1001 Abstract, 1:5-7; 2:12-13; EX-1004 Title, Abstract.

87. It is my opinion that *Dinker* is in the same field of endeavor as the '282 Patent because it relates to "a system and method for enabling failover for an

application server cluster.” EX-1005 ¶2; EX-1001 2:52-54, 3:65-66. *Dinker* is reasonably pertinent to the problem addressed by the ’282 Patent’s claimed invention because *Dinker*’s application-server-cluster solution “provide[d] various types of failover mechanisms to increase the fault-tolerance of an application server cluster,” enabling a “robust” network. EX-1005 ¶33; EX-1001 1:22-25.

88. Moreover, a POSITA readily recognized that *Secer*’s load balancing and failover techniques (discussed in detail for its gateways) would also be applicable to its MS 202, as suggested by *Secer*, and in view of *Dinker*’s teachings. *Secer*’s NMS managed its network elements in a client/server environment similar to the client/server environment of *Dinker*. As described above, *Secer* used distributed gateways in an NMS and provided for assigning network element management responsibility to another gateway when one gateway failed. EX-1004 4:7-21. Indeed, *Secer* stated that it was desirable to “efficiently recover[]” the management of network elements “to minimize the time in which such network element(s) are without management.” EX-1004 1:32-35. *Secer* expressly disclosed that its failover teachings extended to other network management components, stating that its “detection and recovery techniques...may be utilized within **any client/server environment** and may be applied to devices **other than gateways.**” EX-1004 18:12-22. It is my opinion that a POSITA would have realized that such a client/server environment existed between *Secer*’s gateways

(both the claimed *first* and *second adapters* and *gateway*) and MS (*application server instance*) through the exchange of management behavior objects and, in any case, that *Secer's* MS was one such “other” device, given the well-known technique and benefits of clustering application servers, such as taught by *Dinker*.

89. **Second**, *Dinker* suggested using a load-balanced, fault-tolerant application server cluster in a wide variety of applications. For example, *Dinker* stated that the application server clusters of FIG. 1, which shows client computer communicating with a server (i.e., a client/server environment), “may be utilized in **any of various types of systems.**” EX-1005 ¶45. It is my opinion that a POSITA would have readily recognized an NMS, like that of *Secer*, was a system to which *Dinker's* teachings applied. Indeed, a POSITA was familiar with load-balanced, fault-tolerant application server clusters, both generally and specifically in the context of NMS. §§V.1, V.3-4 (citing, *inter alia*, EX-1011 8:15-20; EX-1010 15:35-40, 16:4-11; EX-1012). Moreover, *Secer* suggested that failover systems could be applied to other components and in a client/server environment, like those disclosed in *Dinker*. EX-1004 18:12-22. It is therefore my opinion that a POSITA would have found it obvious to use a load-balanced, fault-tolerant application server cluster as taught and suggested by *Dinker* for *Secer's* NMS.

90. **Third**, it is my opinion that a POSITA would have been motivated to modify *Secer's* NMS system to include a load-balanced, fault-tolerant application

server cluster as taught by *Dinker* for *Dinker*'s expressly stated benefits of improved scalability. For example, *Dinker* disclosed that “**application servers may be added** to a cluster in order **to scale up** the available processing power **by distributing work.**” EX-1005 ¶31. Indeed, the benefit of scale brought by clustering servers was well known to the POSITA. §§V.1, V.2-3 (citing EX-1012 (describing adding more servers dynamically to handle more traffic); EX-1006 7:16-19 (“Utilizing a multitude of servers to process work effectively lessens the work required by a single server and effectively **speeds the response of the system.**”)). *Dinker* explained that the increased processing power, provided by the additional application servers in the application server cluster, allowed the network management system to manage more network elements and process more event information to ensure the proper functioning of the network. EX-1005 ¶31. Furthermore, application server clustering provided additional benefits including increased memory capacity and the ability to provide more application services which enabled more flexibility to the customers and user of the network. EX-1005 ¶¶21, 30-31.

91. **Fourth**, modifying the teaching of *Secer*'s NMS system to include a load-balanced, fault-tolerant application server cluster provided for improved performance and a more efficient use of resources as expressly taught by *Dinker*. EX-1005 ¶¶31, 49. For example, *Dinker* stated that “[a]pplication server clustering

may also facilitate application performance.” EX-1005 ¶31. Additionally, like scalability, this improved performance and a more efficient use of resources provided for by a load-balanced, fault-tolerant application server cluster was well understood by the POSITA outside of *Dinker*. §V.3 (citing EX-1012 ¶31; EX-1011 8:15-20 (“**[b]alancing the customer load among the servers is important, for example, to maintain service to the customers and avoid downtime.**”); EX-1006 5:8-20 (load balancing servers lessens the work required by a single server and “**effectively speeds the response of the system.**”); EX-1012 ¶¶31, 42 (distributing the load evenly among application servers “save[d] costs” and avoided congestion). In addition, *Secer* also taught the benefits of load balancing across its gateways, discussing various load balancing algorithms, as well as failover. EX-1004 4:39-49; 16:61-17:8. Thus, a POSITA would readily apply the same techniques for the same benefits — taught in *Secer*, known in the art, and exemplified by *Dinker* — to MS 202 implemented as a server cluster following *Dinker*.

92. Moreover, the ’282 Patent acknowledges that load balancing across multiple application servers was well known as it provides no details for implementing load balancing, merely stating that “**any** load balancing algorithm” may be used and work can be distributed “in **any desired fashion.**” EX-1001 8:63-64, 9:10-11, 9:54-58. As the ’282 Patent states, “technical material that is

known in the technical fields related to the invention has not been described in detail so that the invention is not unnecessarily obscured.” EX-1001 2:8-11.

93. **Fifth**, it is my opinion that a POSITA would have been motivated to modify the teaching of *Secer*’s NMS to include a load-balanced, fault-tolerant application server cluster as taught by *Dinker* to increase fault-tolerance. EX-1005 ¶33. Indeed, *Dinker* stated that it was “**desirable** to provide various types of failover mechanisms to increase the fault-tolerance of an application server cluster.” EX-1005 ¶33. By having a plurality of application servers, a back-up server would fulfill the role of a first server in the event the first server failed or was taken offline, providing the benefit of redundancy. EX-1005 ¶¶33, 54, 57. Like load balancing and the use of application server clusters, the POSITA was well aware of the benefits of failover systems, including in NMS. §IV.F.4 (citing EX-1012 ¶¶17, 31 79; EX-1006 5:19-22).

94. Moreover, both *Secer* and *Dinker* described establishing associations as part of failover procedures. For example, *Secer* described associating a new gateway with the network elements that were previously managed by a failed gateway. EX-1004 10:24-30, 10:45-52 (reassigning network element management to a new gateway), 17:34-18:11 (reassigning based on load and geographic location between the original NE and replacement gateway), 18:12-28. *Dinker* described a “primary” application server that serviced both (1) client request

originating outside of the server cluster and (2) other application servers inside the cluster, to “manage and provide processing information” necessary to operate, such as session information, for client requests. EX-1005 ¶¶54-55. This information necessary for this role was backed-up in another application server. EX-1005 ¶57, e.g. Fig. 2 (showing shared/mirrored data among servers). When the “primary” server failed, the backup application server already contained the backed-up data and would be promoted to primary, allowing the server cluster to continue operations uninterrupted. EX-1005 ¶57. Such application server clustering was used so that in the case of “failure on one application server” “requests may be routed to and processed by other application servers in the cluster.” ¶30. This shifting of load was well known. §V.4 (citing EX-1006 3:17-21 (discussing “[w]hen a system fails, the remaining available systems **take over the failed system’s load.**”); EX-1007 ¶47 (disclosing “**redirect[ing] certain messages ... from servers which have failed to the available servers**”); EX-1012 ¶¶31, 34-35). Such teachings were also known to extend to other components like adapters, where adapters established a relationship with a secondary application server for the purpose of ensuring that the adapter redistributes the information about network element events. EX-1012 ¶¶31, 81.

95. **Sixth**, it is my opinion that a POSITA would have modified the teachings of *Secer* to include a load-balanced, fault-tolerant application server

cluster as taught by *Dinker* because such a modification required nothing more than merely combining known network components (*i.e.*, adding additional servers and/or server functionality to existing servers) according to known methods (*i.e.*, installing server software and/or server hardware). EX-1005 ¶31.

96. **Seventh**, it is my opinion that a POSITA would have a reasonable expectation of success because the combination involved nothing more than routine and ordinary skill, and such features were already implemented in the NMS context. *Secer* stated its failover mechanisms “may be utilized within any client/server environment and may be applied to devices other than gateways for managing network elements,” and a POSITA would have recognized that an NMS server was just such a client/server environment and/or other components to which failover would apply. EX-1004 18:12-15. Likewise, *Dinker* stated that its load-balanced, fault-tolerant application server cluster “may be utilized in **any of various types of systems**,” and a POSITA would have recognized an NMS, like that of *Secer*, as just such one type of system. EX-1005 ¶45. Indeed, the POSITA was well aware of load-balanced, fault-tolerant application server clusters, including in the context of NMS, as evidenced by the state of the art. EX-1005 ¶33; EX-1004 Abstract; §V.1 (citing EX-1011 FIG. 5 (illustrating a multi-server environment)); EX-1006 7:19-20 (describing a cluster of available servers); EX-1010 15:35-40, 16:4-11 (describing a plurality of application server clusters); EX-

1012 ¶¶31, 34-35 (describing a fault-tolerant, load-balanced NMS)). Thus, it is my opinion that the use of server clusters was widely implemented and known to provide redundancy, additional capacity, and a variety of application services, including NMS. It is my opinion that a POSITA also knew how to implement load-balanced, fault-tolerant application server clusters using nothing more than the routine skill.

97. For the reasons described above, therefore, a POSITA would have been motivated to modify *Secer*'s teachings of a network management system with *Dinker*'s teachings of application server clustering, load balancing, and failover recovery.

#### **4. Detailed Application of *Secer* in Combination with *Dinker* to the Challenged Claims**

##### **Claim 1**

*[1pre] A method, comprising:*

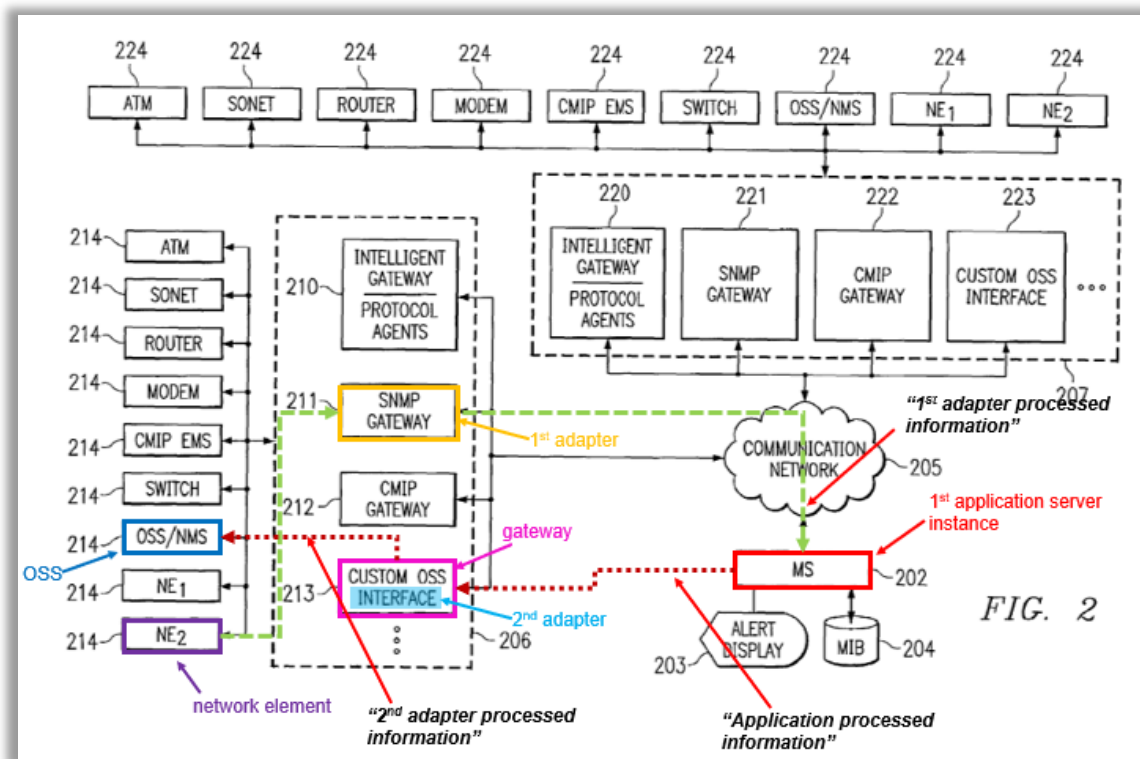
98. *Secer* in view of *Dinker* rendered obvious the method comprising the limitations [1ai]-[1d] as discussed in detail below.

*[1ai] receiving, at a first application server instance selected from a plurality of application server instances based on a load balancing process, first adapter processed information from a first adapter,*

99. *Secer* in view of *Dinker* rendered obvious this limitation. *Secer* disclosed a central management system (MS) 202 (*first application server instance*) and a gateway having adapter functionality (*first adapter*). MS 202

received processed network element data (*first adapter processed information*) from gateway (*receiving, at a first application service instance...first adapter processed information from a first adapter*).

100. *Secer* disclosed its MS 202 (*first application server instance*) (red) and gateway having adapter functionality (*first adapter*) (gold) in, e.g., FIG. 2:



EX-1004 FIG. 2 (annotated).

101. *Secer* disclosed that the network element data included information about the operation/performance of the network element(s), such as operational and health data including fault messages (traps), a network element’s CPU utilization, network element rebooting information, available storage capacity

information, network element interface information, etc. EX-1004 2:12-35; 2:41-52.

102. *Secer* disclosed that MS 202 (*first application server instance*) received the network element data that was first processed by a gateway (*first adapter*) according to a particular communication protocol (*first adapter processed information*). For example, *Secer* disclosed MS 202 (*first application server instance*) (red) comprised a server for network management that received data collected from the “*network elements 214*” (purple) at the gateway group 206. EX-1004 9:13-26, FIG. 2. *Secer*’s MS 202 is an application server of a network management system because it “manag[es] communication networks and network elements,” including receiving communications from its gateways (adapters) and directing the actions of gateways and network elements using “management behavior” objects. EX-1004 1:52-2:1 (“MSs,’ encompass ... NMSs”); 9:17-10:11, *see also* [1b], below. The *network elements* managed by MS 202 included “routers, switches, computer equipment, etcetera” that communicated using “different protocols.” EX-1004 1:57-64.

103. Next, *Secer* disclosed that gateways 210, 211, 212, 213 (*first adapter*) (gold) facilitated communication between the MS 202 and network elements 214. EX-1004 9:13-18. *Secer* explained that “[e]ach of the distributed gateways may, for example, be any suitable processor-based device operable to manage (e.g.,

receive unsolicited messages and/or poll) its respective network elements.” EX-1004, 9:13-26. *Secer* further disclosed that its gateways perform typical monitoring of network elements to detect faults, including polling network elements to request information about the operation/performance of the network element (all network element data). EX-1004 2:39-52. For example, a gateway periodically polled a network element to determine whether the network element is operational. EX-1004 2:52-54. A failure of a network element to respond to a poll is indicative of a problem (e.g., failure) with the network element. EX-1004 2:52-58. Gateways also periodically polled network elements to determine the NE workload, available memory capacity, etc. EX-1004 2:49-61.

104. *Secer* further disclosed that the gateways monitored network elements having particular communication protocols, including as examples SNMP gateway 211, CMIP gateway 212, and custom OSS interface gateway 213, which monitor various network element types 214 having various protocols, such as ATM, SONET, routers, modems, CMIP EMSs, switches, OSS/NMSs, as well as various other network elements local to group 206. EX-1004 8:57-9:3. *Secer’s* distributed gateways included functionality to process information received from network elements 214 (network element data) to include filtering and translating from “one plurality of different protocols to another plurality of different protocols.” EX-1004 9:21-26, cl. 23. *Secer’s* disclosure of the functionality of its gateways is

consistent with the '282 Patent's disclosure that adapters process information to facilitate communication between the NMS server and NEs using different protocols. EX-1001 2:64-67. Thus, Secer's gateways including adapter functionality and were *adapters*.<sup>5</sup>

105. Thus, Secer disclosed MS 202 (*first application server instance*) received processed network element data (*first adapter processed information*) from a gateway (*first adapter*).

106. Although, Secer did not expressly disclose that its MS (*a first application server instance*) was “*selected from a plurality of application server instances based on a load balancing process.*” Dinker disclosed these features. EX-1005 ¶49.

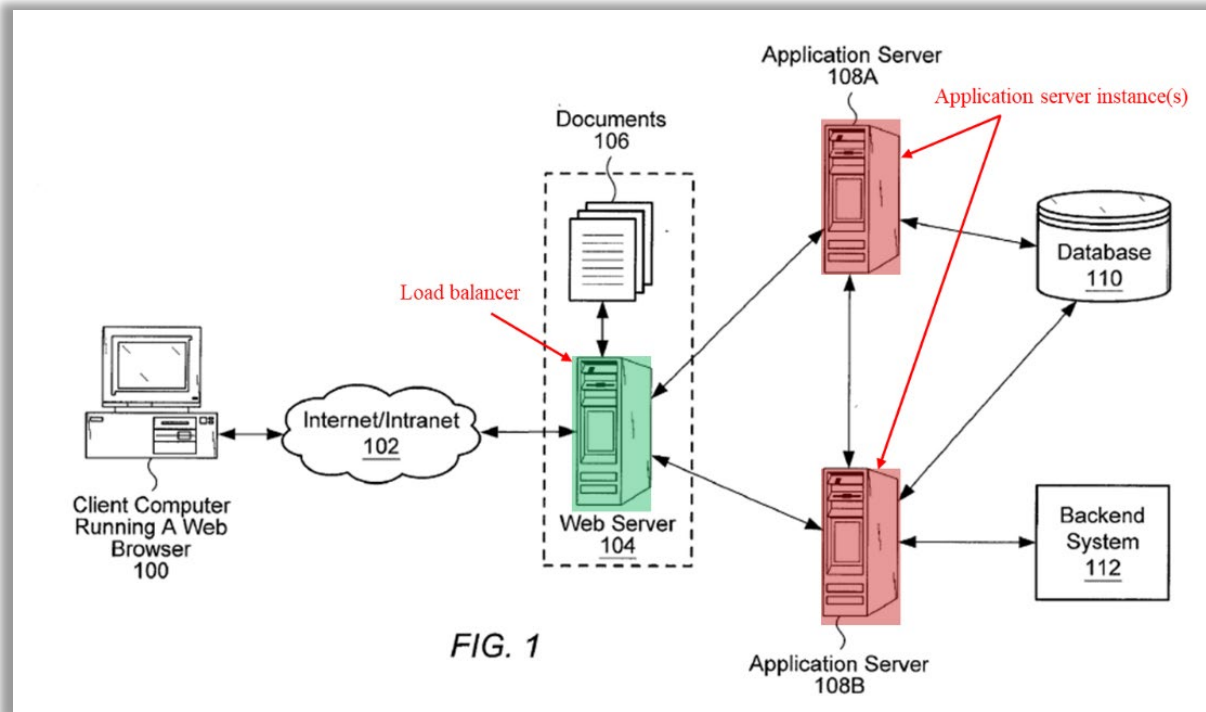
107. Dinker disclosed an application server cluster (*a plurality of application server instances*) and explained that the application server instances of the application server cluster included “[a]pplication code [that] may be replicated across multiple application servers in the cluster, enabling a given request to be

---

<sup>5</sup> Although gateway 211 is annotated as the *first adapter* in FIG. 2, each of the other gateways are independent examples of a *first adapter* because they perform the same function as gateway 211.

processed by any of these multiple application servers” (*application server instances*). EX-1005 ¶¶23, 32.

108. For example, *Dinker* illustrated a plurality of application server instances (red):



EX-1005 FIGs. 1 (annotated), FIGs. 2 and 3A (illustrating more servers and various data sharing).

109. *Dinker* further disclosed the application server cluster included a broker (server) (e.g., web server) (green) that used “load balancing techniques” to select an application server (*a load balancing process*) to service the received requests. EX-1005 ¶49. *Dinker’s* broker (e.g., web server) is an example of a *load balancing component*. While the load balancer/balancing would thus conveniently

be a software module of the gateway/adaptor following *Dinker's* broker teaching, a POSITA understands that the module could also be conveniently co-located in other components of *Secer's* distributed NMS, including co-locating the function as a role of a "primary" application server instance of MS 202 following *Dinker's* framework (EX-1005 ¶¶54, 54) and *Secer's* teaching of load balancing coordination at the MS 202 (EX-1004 15:13-21) readily extendable to server load, or in a separate component such as monitor 401, 603 sitting between the gateways and server instances (EX-1004 11:37-12:6, FIGs. 4, 6). I understand that while obviousness does not require engineering an actual system, a POSITA would readily recognize that any of these options would be viable to implement the well-known techniques and benefits of load balancing. Likewise, load balancer 374 of the '282 Patent was a software module described simply as being "located on any device in NMS 300." EX-1001 9:8-11. *See also* [3d]; EX-1005 ¶49;

110. A POSITA would be motivated to modify *Secer's* teachings to include multiple instances of MS 202 (*application server instance*) and perform load-balancing among the MSs (*based on a load balancing process*) as taught by *Dinker* for the reasons described in the Motivation to Combine Section above. §VI.A.3. For example, *Dinker* disclosed that multiple application servers facilitated application performance and scalability. EX-1005 ¶¶21, 31. *Dinker* also disclosed

using “load balancing techniques” to select an available application server to process requests. EX-1005 ¶49.

111. Moreover, it was already widely known to use a cluster of application server instances for network management and load balancing to distribute the load over the plurality of application server instances for the known benefits of scalability, redundancy, fault tolerance, etc. §VI.A.3; §V. In addition, the ’282 Patent trivializes the load balancing aspects of the claims as evidenced by the lack of details provided with respect to the load balancing techniques, stating little more than that “**any** load balancing algorithm” may be used, and just be software located “on any device” in the NMS. EX-1001 8:63-64, 9:8-11, 9:54-58 (“The load balancer allows the management work load to be distributed among all server instances in **any desired fashion.**”). Thus, a POSITA would readily recognize the applicability of *Dinker’s* teachings to *Secer*, and have a high degree of expected success in combining their teachings to achieve well-understood, predictable benefits. §VI.A.3.

112. Thus, *Secer* in view of *Dinker* disclosed this limitation.

*[1aii] wherein the first adapter processed information comprises event information received by the first adapter from a network element and processed by the first adapter based on a first communication protocol;*

113. *Secer* disclosed this limitation. As discussed in [1ai], *Secer's* gateways including adapter functionality (*first adapter*) received the network element data, such as a trap messages, events, or poll information, sent by network elements (*event information received by the first adapter from a network element*) and processed the network element data using a particular communication protocol (e.g., SNMP, CMIP, etc.) (*processed by the first adapter based on a first communication protocol*) to form the processed network element data (*first adapter processed information*). See [1ai].

114. *Secer* described that network elements sent network element data (trap messages, events, or poll information) to a gateway (*event information received by the first adapter from a network element*), and the gateway processed the network element data according to various communication protocols used by the network elements (*processed by the first adapter based on a first communication protocol*). EX-1004 3:52-62; 8:57-9:26. For example, as shown in FIG. 2, the SNMP gateway 211 processed the network element data (*event information*), from network element 214 in accordance with the SNMP protocol (*first communication protocol*). EX-1004 FIG. 2. *Secer* disclosed other communication protocols such as CMIP and referenced other protocols used by, e.g., ATM, SONET, routers, modems, CMIP EMSs, switches, and OSSs/NMSs network elements. EX-1004 9:62-10:3. The SNMP gateway (or other protocol-specific gateway) processed

network element data (*first adapter processed information*) was then relayed to MS 202 for further processing. EX-1004 9:3-18.

115. Thus, *Secer* disclosed this limitation.

***[1b] processing, by the first application server instance, the first adapter processed information based on an event management service to produce application processed information;***

116. *Secer* disclosed this limitation. As discussed in [1ai], *Secer* disclosed that MS 202 (*first application server instance*) received the processed network element data (*first adapter processed information*). See [1ai]. The processed network element data (including filtered and/or translated events such as trap messages and poll information) was used by MS 202's "management process" (*event management service*) to identify and generate a "management behavior object" (*to produce application processed information*). EX-1004 10:21-24.

117. *Secer* disclosed that the processed network element data (*first adapter processed information*) is sent from the gateway (*first adapter*) to MS 202 (*first application server instance*) for further processing. EX-1004 9:13-26. For example, *Secer* disclosed that the processed network element data was generated in response to messages or "events," examples of which include trap messages and polling information, from network elements. EX-1004 3:52-55; 7:43-46, 9:17-22, 10:62-66. These messages and events related to both fault management (e.g., management of unsolicited messages) and performance management (e.g., polling

of network elements). EX-1004 10:21-24. *Secer* disclosed that MS 202 used a “management process” to access “network element and/or gateway” specific “management behavior objects.” EX-1004 9:34-9:62. Such objects “define[d]...management behavior responsive to particular trap messages or...polling” and specified “one or more distributed gateways which need to execute the defined management behavior.” EX-1004 9:62-10:4. MS 202 would then push the management behavior object to the appropriate gateway(s). EX-1004 10:4-8. Thus, *Secer*’s MS 202 “management process” took processed network element data, identified the management behavior object, and “pushed” it to appropriate gateway(s) (*processing, by the first application server instance, the first adapter processed information based on an event management service to produce application processed information*).

118. *Secer*’s disclosure is consistent with the disclosure of the ’282 Patent. For example, the ’282 Patent discloses an event log manager. EX-1001 5:24-29, 5:55-63. The ’282 Patent states that its event management service “collects and records **various events** from the network,” including “SNMP trap” and “periodic performance monitoring,” and “alarm[s].” EX-1001 55-63. These are the same sort of “events” handled by MS 202’s “management process.” Therefore, *Secer* disclosed an “*event management service*.”

119. Thus, *Secer* disclosed this limitation.

**[1ci] sending, by the first application server instance, the application processed information to a gateway device,**

120. *Secer* disclosed this limitation. *Secer* described that once MS 202 (first application server instance) identified the management behavior object (application processed information), MS 202 “push[ed]” the management behavior object to the appropriate gateway (a gateway device) to which the management behavior relates (sending, by the first application server instance, the application processed information to a gateway device).

121. For example, *Secer* disclosed gateways, such as custom OSS interface gateway 213, (gateway device) (pink) coupled between OSS 214 (blue) and MS 202 (first application server instance) (red):

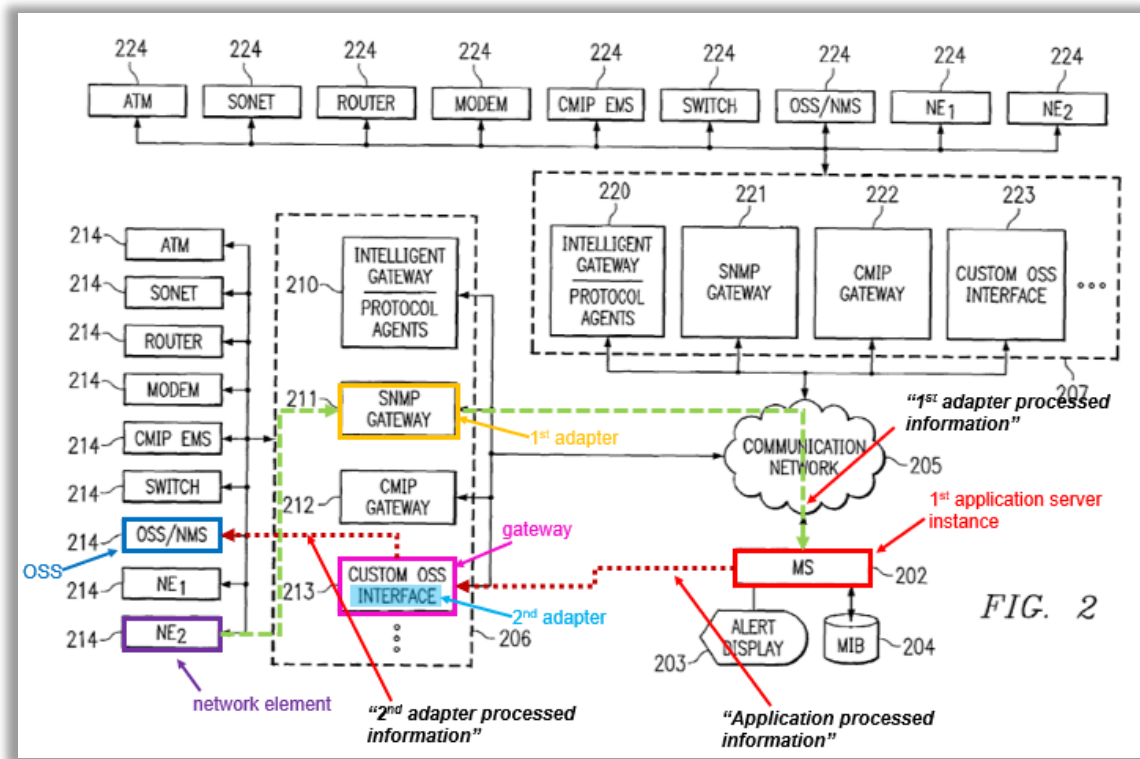


FIG. 2

EX-1004 FIG. 2 (annotated).

122. *Secer* described that the management behavior object (*application processed information*) is “push[ed]” from MS 202 (*sending, by the first application server instance*) (red) to gateway 213<sup>6</sup> (*gateway device*). EX-1004 10:4-11. A POSITA understood that *Secer* disclosed sending data to the gateway 213 as defined by the management behavior object. As discussed above, the OSS oversaw network elements, and any information related to network elements (e.g., performance characteristics, faults, configuration, etc.) would have been understood as having been propagated to the OSS as part of its management role. EX-1004 1:52-2:1 (“MSs,’ encompass...NMSs”); 9:17-10:11; §V.1. Thus, A POSITA would have understood that *Secer*’s management behavior object would specify the OSS gateway 213 to ensure the propagation of this information.

123. As discussed above, *Secer*’s gateways<sup>7</sup> processed and relayed communication between central MS 202 and OSS 214, and included functionality to convert communications of different protocols. EX-1004 8:60-9:13. *Secer*’s

---

<sup>6</sup> Although gateway 213 is annotated as the *gateway device* another example is gateway 223, which had similar functionality and meet the requirements of the claimed *gateway device*.

<sup>7</sup> *Secer*’s gateways are both the claimed adapter and gateway device.

disclosed gateways including both *gateway* functionality and *adapter* functionality consistent with the '282 Patent's gateway and adapters. For example, the '282 Patent explains that its gateway “**processes the event and distributes the information** appropriately to each NB adapter” and “**relays management information** and operations between server 232 and an external OSS 208.” EX-1001 3:25-27, 4:4-5. The '282 Patent also describes that its adapters “process information to facilitate communication between NMS and OSS **using different types of protocols.**” EX-1001 2:53-61.

124. Thus, *Secer* disclosed this limitation.

*[Icii] wherein the gateway device is one of a plurality of gateway devices respectively associated with the plurality of application server instances and is configured to transfer the application processed information to a second adapter of a plurality of second adapters configured to process the application processed information based on a second communication protocol to produce second adapter processed information and transfer the second adapter processed information to an operation support system device; and*

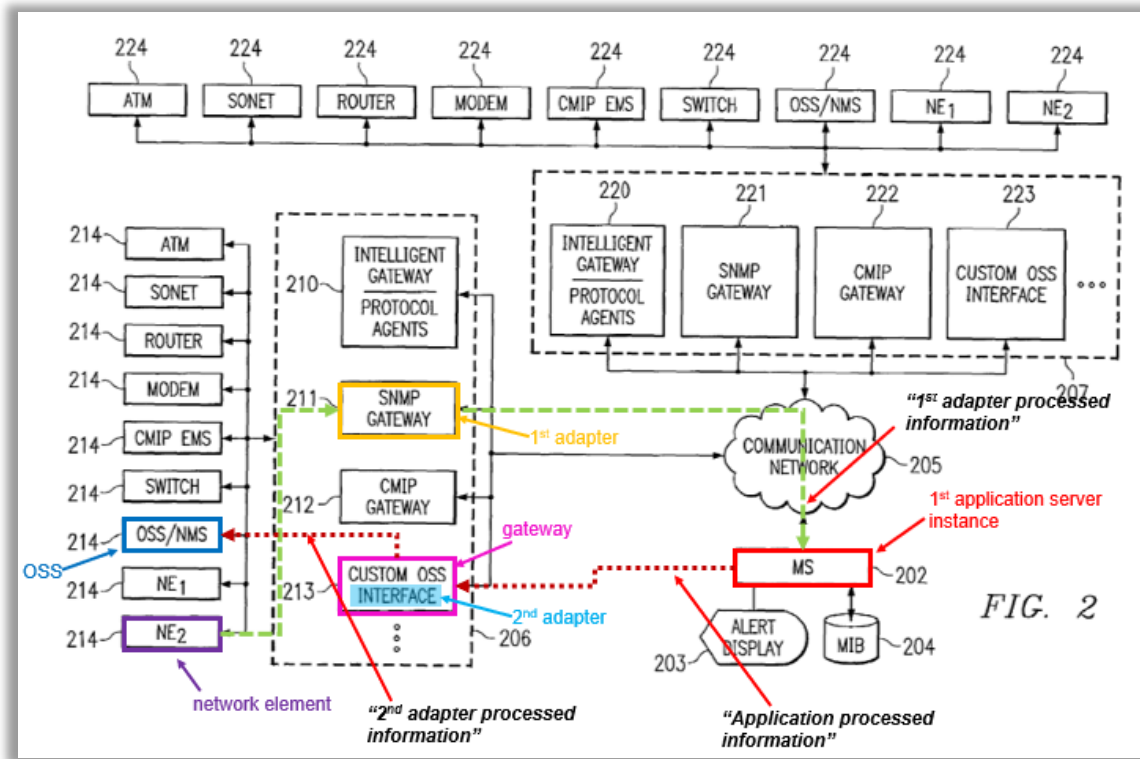
125. *Secer* in view of *Dinker* rendered obvious this limitation.

126. *Secer* disclosed custom OSS interface gateway 213 among other gateways (e.g., gateways 210-213, 220-223) (each a *gateway device* and an *adapter*) in communication with MS 202, a load-balanced, fault-tolerant server cluster as modified by *Dinker* (*wherein the gateway device is one of a plurality of gateway devices respectively associated with the plurality of application server*

*instances*) (see [1ai]) and the gateways received management behavior objects (*application processed information*) from MS 202. Secer's gateways included both gateway functionality to transfer the communication (*gateway device*) and adapter functionality (*second adapter*) to process the management behavior object (*configured to transfer the application processed information to a second adapter and configured to process the application processed information based on a second communication protocol to produce second adapter processed information*, respectively). Secer's custom OSS interface gateway 213 communicated with OSS 214 according to the appropriate OSS protocol (*transfer the second adapter processed information to an operation support system device*). Secer's other gateways (e.g., gateways 223) (*a plurality of second adapters*) also communicated with an OSS (another example of *configured ... transfer the second adapter processed information to an operation support system device*).

127. As illustrated in FIG. 2 below, gateway group 206 (*a plurality of gateway devices*) included gateways 210-213 (each, individually, a *gateway device*) where custom OSS interface gateway 213 (*the gateway device*) (pink) received the management behavior object (*application processed information*)

from the load-balanced, fault-toleration MS 202 (associated with the plurality of application server instances):<sup>8</sup>



EX-1004 FIG. 2 (annotated). As described in limitation [1ci], gateway 213, as well as other gateways (including 223) included functionality to recognize and process (filter and translate) different protocols, which the '82 Patent refers to as an *adapter*. EX-1004 2:29-35; 9:3-16; cl. 23. Thus, gateways 213 and 223 were a *plurality of second adapters*. The gateways included, custom OSS interface

<sup>8</sup> Each gateway device received management behavior objects from MS 202 and, therefore, were *respectively associated with the plurality of application server instances*. See also [1ai].

gateway 213 (pink), in addition to 223, that included functionality (light blue) to recognize and process different protocols (*second adapter*).<sup>9</sup> EX-1004 9:3-16.

128. *Secer* disclosed that gateway 213 monitored OSS 224 having a particular communication protocol. EX-1004 9:3-16. Moreover, *Secer* disclosed that MS 202 (*application server instance*) communicated (e.g., “push[ed]”) the created management behavior (e.g., the object defining such management behavior) to the appropriate gateways and NEs to which the management behavior relates. EX-1004 10:4-12. In other words, the management behavior object (*application processed information*) for gateway 213 and OSS 214 would be communicated to gateway 213 (pink) for processing using, e.g., the OSS interface protocol (*to process the application processed information based on a second communication protocol to produce second adapter processed information*). EX-1004 10:4-12. Custom OSS interface gateway 213 would send the processed management behavior object (*second adapter processed information*) to OSS 214 (*transfer the second adapter processed information to an operation support system*

---

<sup>9</sup> Although gateway 213 is annotated as including the *second adapter* in FIG. 2, this is only one example, and because each of the gateways 210-212 and 220-223 have similar functionality; any of these gateways would satisfy the claimed *second adapter* for similar reasons.

*device*). EX-1004 10:4-12, 18:12-15, FIG. 2. A POSITA understood that the custom OSS interface gateway 213, is an intermediary and bridges the communication between the OSS 214 and MS 202, where the custom OSS interface gateway 213 forwarded the management behavior object information (failure, performance data, etc.) to the OSS 214 because the OSS manages the network. [1ci]; §V.1.

129. Therefore, *Secer* in view of *Dinker* rendered obvious this limitation.

***[1d] in response to determining that the first application server instance has become disabled, facilitating establishing an association between the first adapter and a second application server instance of the plurality of application server instances and between the gateway device and the second application server instance.***

130. *Secer* in view of *Dinker* rendered obvious this limitation. *Secer* detailed techniques and benefits of using distributed gateways, and how to detect and recover from a failure of a gateway. EX-1004 7:64-8:6, 10:12-16, 10:31-40, 13:37-17:8, FIGs., 3, 5, 6. In response to such failure, recovery was achieved by reassigning management (*association[s]*) of NEs to an available gateway. EX-1004 10:45-52. *Secer* stored *associations* between gateways and managed NEs in management information base (MIBs), which was part of or coupled to MS 202, containing management behavior objects. EX-1004 9:34-44, FIG. 2. These “objects may have an attribute specifying the relationship of such objects to the network elements and/or gateways.” EX-1004 9:53-55. Thus, when a new

gateway became responsible for managing a NE, such objects would be “modified” with the new gateway so that the “central MS may determine to which gateways and/or network elements the object relates and implement the management behavior defined by such object for the related network elements and/or gateways.” EX-1004 9:58-62.

131. *Secer* specifically taught how MS 202 would coordinate recovery of the distributed NMS in the event of a failure of a gateway. EX-1005 13:37-17:8, FIGs, 3, 5, 6. *Secer* taught managing the relationships in “gateway management description information” stored local (internal or external) to MS 202. EX-1004 14:47-53, FIG. 6. “Gateway management description information... include[d] a list of managed devices to which each gateway is assigned management responsibility.” EX-1004 14:53-56. Such information also included an “available gateway list” and “gateway load.” EX-1004 14:64-15:21. Once failover was detected (e.g. by monitor 603) and an appropriate gateway identified, “recovery information” was “provided to such ‘substitute’ gateways to enable them to recover management of the network elements.” EX-1004 15:22-60. “Thus, a substitute gateway [] is assigned management responsibility for a device” in place of “a failed gateway” in a timely and efficient manner. EX-1004 15:62-63, 10:49-53.

132. While *Secer* disclosed recovering from a failed gateway, including establishing the necessary associations for a second gateway, it did not expressly disclose doing so for failures of an application server instance in a server cluster. Yet, *Secer* expressly disclosed that its failover teachings should be applied to other components including “devices other than gateways for managing network elements” and those in “client/server relationships.” EX-1004 18:12-15.

133. In the same vein, *Dinker* disclosed using distributed application server instances, detecting a failure of a first application server instance and, in response, facilitating establishment of associations with a second application server instance, all consistent with server clustering. EX-1005 ¶¶32, 33, 57, 30; §§V.1, V.4. *Dinker* taught application server clustering so that in the case of “failure on one application server” “requests may be routed to and processed by other application servers in the cluster.” ¶30. Likewise, *Dinker* observed that “in computer systems” it was desirable to “failover mechanisms to increase the fault-tolerance of an application server cluster”, including a “backup operational mode” where secondary components took over for primary components when they fail. EX-1005 ¶33.

134. In such a cluster, *Dinker* taught a framework in which at least one server should be designated a “primary” application server to “manage and provide processing information” necessary for the other servers in the cluster to operate,

such as session information for client requests. EX-1005 ¶¶54-55. The information necessary for this role was mirrored as back-up data by another application server designated as a “backup” for the extra roles of the “primary” server. EX-1005 ¶57, e.g. Fig. 2 (showing shared/mirrored data among servers). When the “primary” server failed, the backup server already contained the backed-up data and would be promoted so as to support the server cluster in the role of primary server, providing the extra management and data necessary for the remaining servers in the cluster to continue operations uninterrupted. EX-1005 ¶57. *Dinker* taught that all the servers in the cluster should send each other “heartbeat” messages such that a failure of a server instance would be quickly detected. EX-1005 ¶85. *Dinker* explained that, “[i]n response to determining that a cluster failure occurred, one or more backup application server computers may be promoted to a primary server role” (*in response to determining that the first application server instance has become disabled, facilitating establishing an association ...*). EX-1005, ¶¶35, 57.

135. As already discussed, it would have been obvious to implement *Secer*’s MS 202 as a server cluster following *Dinker*. See §§VI.A.4.[1ai]; VI.A.3. Likewise, it would have been obvious to extend *Secer*’s failover teachings for gateways to also include failover between servers of the MS 202 server cluster following *Dinker*’s failover teachings for application servers.

136. I have been informed and understand that, while obviousness does not entail engineering an actual system (and the '282 Patent provides no information at all), a POSITA would readily recognize that *Secer's* coordination of the reassignment of management roles, and shared state information, to recover from a failed gateway (*see, e.g.*, discussion including *Secer's* MIBs and FIG. 6 above) would readily be beneficially extended to coordinate (*facilitate establishing associations*) the recovery of a failed MS 202 server instance as a responsibility of a designated "primary" application server instance in the MS 202 cluster, with such MIB and state information mirrored to the designated back-up server instance in the framework taught by *Dinker*. EX-1005 ¶¶ 54-54, FIGS 1, 2. Thus, the "primary" server instance would coordinate any failover of the other server instances using the same techniques *Secer* already detailed for gateway failures. If the "primary" server instance itself failed, the designated back-up server would readily be promoted to primary, following *Dinker's* teachings for clustered servers, and thus carry out the reassignment of the gateways/adapters and network elements to itself or another available server in the cluster. *Secer* as modified by *Dinker* therefore disclosed the primary server (*first application server instance*) utilized a back-up server (*second application server instance*) to continue providing service.

137. As to the actual detection of a server instance failure, *Secer* already disclosed that the MS 202 can detect gateway failures, and that that functionality

can also be housed in “gateway monitors” (see monitors 401, 603 in FIGs. 4, 6) that communicate failures back to MS 202. EX-1004 0:31-52. It would have been obvious to implement heartbeat messages between the server instances of an MS 202 cluster as taught by *Dinker* (EX-1005 ¶85), or to adapt the monitors 401, 603 of *Secer* to add that functionality, for the self-evident benefit of quickly detecting the failure of a server in the MS 202 cluster.

138. A POSITA understood that with *Secer* modified by the teachings of *Dinker* to include a second *application server instance*, when the *first application server instance* fails, the system would establish the associations (*facilitating establishing an association*) necessary to continue operation, including between the new server instance and both gateway 211 (*first adaptor*) (gold) and gateway 213 (*the gateway device*) as discussed above. See also §VI.A.3; [1ai]. It would have been readily apparent to a POSITA to *facilitate establishing the association* needed to maintain continuity of communication in the event of a failure of a *first server instance* of *Secer*'s MS 202 following the server clustering and failover teachings of *Dinker*.

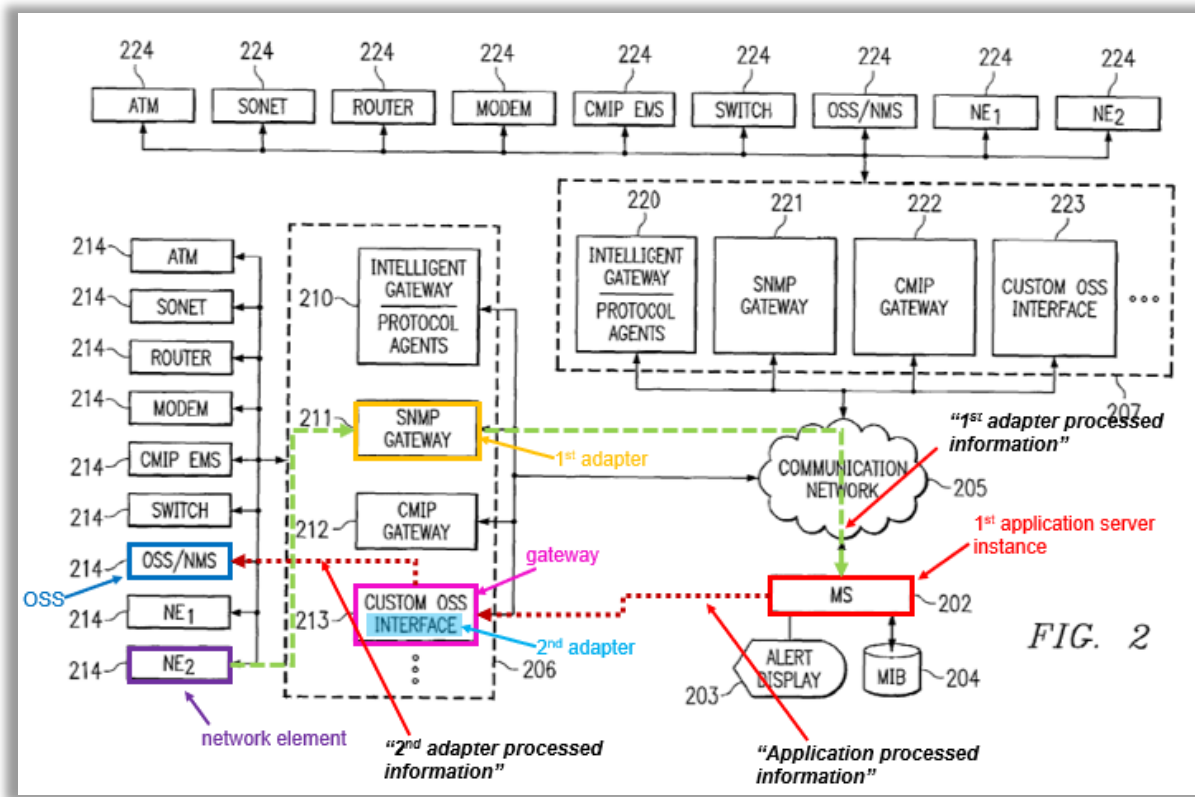
139. A POSITA would have been motivated for the reasons above, as well as those described in the Motivation to Combine. §VI.A.3; see also VI.A.4.[1ai].

140. Thus, *Secer* in view of *Dinker* rendered obvious this limitation.

## **Claim 2**

[2] *The method of claim 1, wherein the first application server instance is configured to execute on a separate physical machine from the first adapter.*

141. *Secer disclosed this limitation. Secer’s disclosed “distributed” gateways, e.g., SNMP gateway 211 including adapter functionality (first adapter) separated from MS 202 (first application server instance configured to execute on a sperate physical machine):*



EX-1004 FIG. 2 (annotated).

142. *Secer further explained that MS 202 can exist within an “client/server environment” where it was routine for the server to be a separate physical machine.*

EX-1004 18:12-15, FIG. 1, 6:33-38, 6:54-57, 6:64-7:1. *Secer also disclosed that*

the gateways (*first adapter*) were devices geographically distributed from MS 202 (*first application server instance*). EX-1004 9:13-18, 13:37-42. Moreover, *Secer* disclosed communication network 205 (e.g., the Internet) between the MS and gateways. Thus, at least the two devices (*machines*, i.e., MS 202 and gateway 211) are physically separate.

143. Thus, *Secer* disclosed this limitation.

### **Claim 3**

**[3pre] *A system, comprising:***

144. *Secer* in view of *Dinker* rendered obvious *a system* comprising limitations [3a]-[3g] discussed below.

**[3a] *a first application server instance configured to receive first adapter processed information from a first adapter[,]<sup>10</sup> process the first adapter processed information based on an event management service to yield application processed information,<sup>11</sup> and***

145. *Secer* disclosed this limitation for the reasons discussed in limitations [1ai] and [1b].

---

<sup>10</sup> I have been informed that the punctuation (“comma (,)”) was added for clarity.

<sup>11</sup> I have been instructed to interpret “Application processed information” “application server processed information” for the purposes of this Declaration.

See [3b], [3e].

**[3b] send the application server processed information to a gateway device,**

146. *Secer* disclosed this limitation for the reasons discussed in limitation [1ci].

**[3c] wherein the first adapter processed information comprises event information from a network element that has been processed by the first adapter based on a first communication protocol; and**

147. *Secer* disclosed this limitation for the reasons discussed in limitation [1aii].

**[3d] a load balancing component configured to select the first application server instance from a plurality of application server instances based on a load balancing process;**

148. *Secer* in view of *Dinker* rendered obvious this limitation for the reasons discussed in limitation [1ai].

**[3e] wherein the gateway device is one of a plurality of gateway devices respectively associated with the plurality of application server instances and is configured to transfer the application server processed information to a second adapter of a plurality of second adapters configured to process the application server processed information based on a second communication protocol to yield second adapter processed information, and**

149. *Secer* in view of *Dinker* rendered obvious this limitation for the reasons discussed in limitation [1cii].

**[3f] send the second adapter processed information to an operation support system device, and**

150. *Secer* disclosed this limitation for the reasons discussed in limitation [1cii].

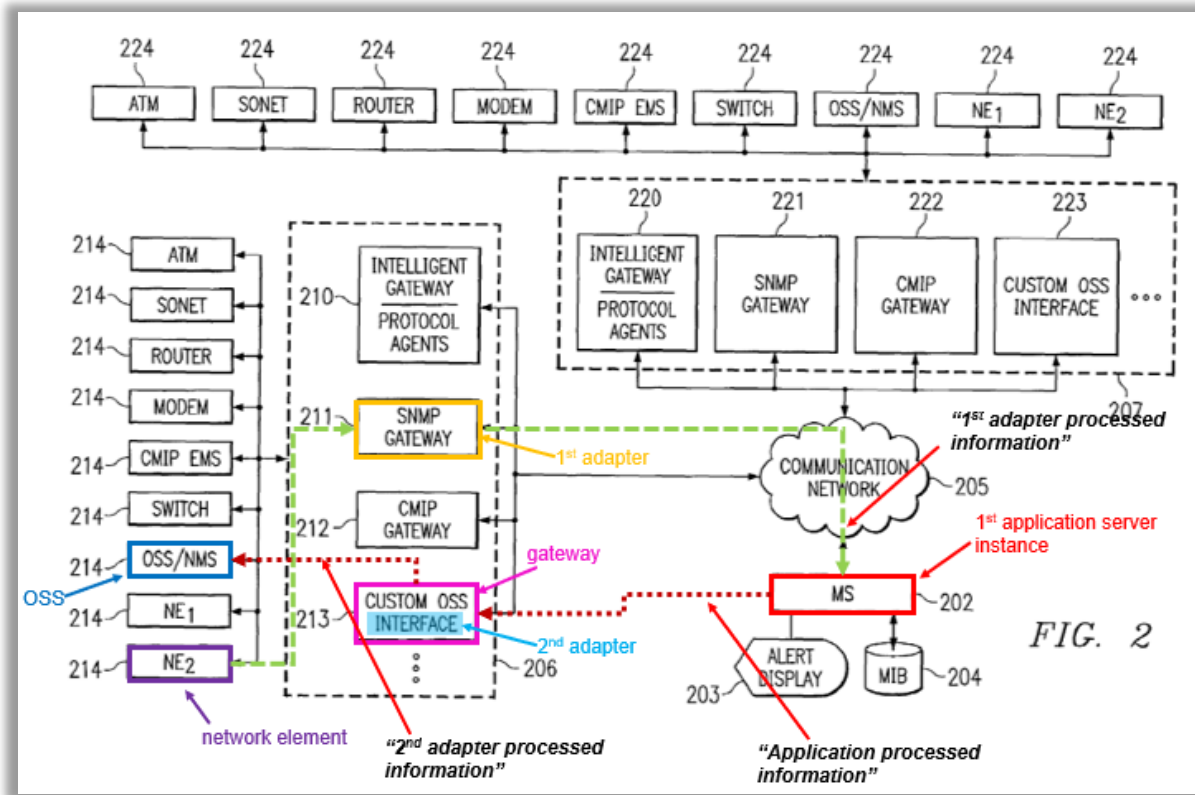
**[3g] *wherein, the first adapter and the gateway device are further configured to, in response to disablement of the first application server instance, establish an association with a second application server instance of the plurality of application server instances.***

151. *Secer* in view of *Dinker* rendered obvious this limitation for the reasons discussed in limitations [1ci-1cii] and 1[d].

#### **Claim 4**

**[4] *The method of claim 1, further comprising converting, by the second adapter, a protocol specific message associated with the first application server instance to a formatted message associated with the second communication protocol.***

152. *Secer* disclosed this limitation for the same reasons discussed in limitations [1ci-cii]. *Secer* disclosed a custom OSS interface gateway 213 that included adapter functionality (*second adapter*) processed communication (e.g., management behavior object) (red dashed arrow) between OSS 214 and MS 202 (*converting ... a protocol specific message associated with the first application server instance to a formatted message associated with the second communication protocol*):



EX-1004 FIG. 2 (annotated). Custom OSS interface gateway 213 (*second adapter*) received communications (management behavior objects from MS 202 (*first application server instance*)) that operated according to its own protocol and a protocol used by communication network 205. EX-1004 8:62-9:3; FIG. 2.

Custom OSS interface gateway 213 (*second adapter*), included functionality (light blue) to recognize and process (convert) different protocols.<sup>12</sup> EX-1004 8:62 9:16; *see also*, [1cii] (discussing the operation of *Secer's gateway (second adapter)*).

<sup>12</sup> Although gateway 213 is annotated as including the *second adapter* in FIG. 2, this is only one example. *E.g.*, Gateway 223 would also be a second adapter.

*Secer disclosed the custom OSS interface gateway 213 converted the received communication from the MS to protocol for communication to OSS 214. EX-1004 FIG. 2; 8:62-9-16; 9:27-10:11 (NE- and gateway-specific management behavior objects).*

153. Thus, *Secer* disclosed this limitation.

### **Claim 5**

***[5] The method of claim 1, further comprising selecting the first application server instance based on a determination that the first application server instance has a lowest processing load of the plurality of application servers instances.***

154. *Secer* in view of *Dinker* rendered obvious this limitation. As discussed in [1ai], *Secer* in view of *Dinker* disclosed selecting the *application server instance based on load balancing process*. See [1ai ]; §VI.A.3.

155. *Secer* also expressly disclosed selecting a gateway based on a lowest processing load because it had the “minimum load,” e.g., the lowest CPU load. EX-1004 14:19-45, 15:16-21, 17:9-33 (“minimum load”), FIG. 7. As discussed above, *Secer* also stated, that its “detection and recovery techniques... may be applied to devices other than gateways.” EX-1004 18:12-15. A POSITA would have recognized that such devices would include *Dinker’s* load-balanced application server cluster. See [1ai]. Further, it was well known that load-balancing included “evening” the load, and the term “balance” connotes distributing the load to servers with less load to bring about this “balance.” §V.3

(citing EX-1012 ¶81 (evenly distributing load); EX-1011 8:15-20, EX-1010 15:35-40).

156. Thus, *Secer* in view of *Dinker* rendered obvious this limitation.

### **Claim 6**

**[6] *The method of claim 1, wherein the first communication protocol and the second communication protocol comprise one or more communication protocols associated with at least one of extensible markup language, simple network management protocol, common object request broker architecture, or transaction language 1.***

157. *Secer* disclosed this limitation. *Secer* stated, “[b]ecause different types of network elements may communicate in different protocols, management systems may utilize different processes for managing different types of network elements...[a] Simple Network Management Protocol (SNMP) gateway process may be implemented for managing SNMP devices” (*wherein the first communication protocol and the second communication protocol comprise one or more communication protocols associated with at least one of ... simple network management protocol*). EX-1004 1:64-2:1; 2:4-6; 2:26-32; 8:62-9:16; FIGS. 2. *Secer* disclosed the gateways using the SNMP protocol (*first communication protocol*) and an OSS protocol (*second communication protocol*).

158. A POSITA understood that such OSS protocols included, or it would have been obvious to include, SNMP because SNMP was known as one of the

most common communication protocols in network management systems. §V.1 (citing, e.g., EX-1009 3:49-54); EX-1012 ¶75. Likewise, a POSITA would have understood that such protocols for the OSS would have included, or it would have been obvious to include the “*Common Object Request Broker Architecture*” (CORBA), because that was also a well-known protocol for communicating between components in an OSS. §V.1 (citing, e.g., EX-1008 4:63-67).

159. Thus, *Secer* disclosed this limitation.

### **Claim 7**

**[7] *The method of claim 1, further comprising at least one of collecting, recording, or publishing the event information in accordance with the event management service for access by the operation support system device.***

160. *Secer* disclosed this limitation. *Secer* disclosed the processed network element data (including filtered and/or translated events such as trap messages and poll information (*event information*)) was used by MS 202’s “management process” (*event management service*) to identify and generate a “management behavior object.” EX-1004 9:17-26; 9:23-26; 10:21-24. MS 202 collected and stored this event information. EX-1004 9:34-44. *Secer*’s FIG. 2 showed OSS 214 coupled to MS 202 that collected the *event information*. EX-1004 FIG. 2. A POSITA understood that OSS 214 has access to the stored *event information* of *Secer* because it is coupled to MS 202 via the custom OSS interface gateway 213 where the OSS is tasked with managing the network and network elements. *See*

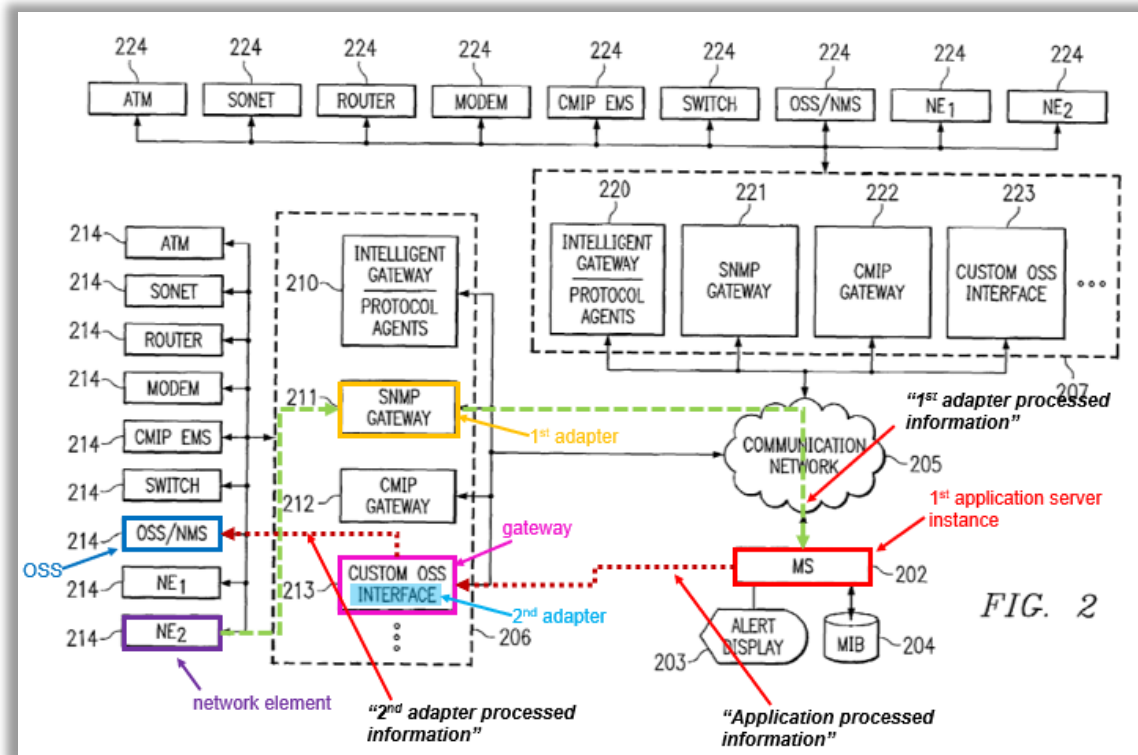
[1ci-1cii]. Moreover, the NE event information associated with a management behavior object would be communicated to the OSS (*publish[ed]*) to inform the OSS of the conditions of the network it managed. *See* [1c]-[1cii]; §V.1.

161. *Secer* disclosed this limitation.

### **Claim 8**

**[8] *The method of claim 1 wherein the plurality of gateway devices comprise a plurality of physically or logically separated gateway devices.***

162. *Secer* disclosed this limitation for the reasons discussed in limitation [1cii] above. *Secer's* FIG. 2 showed the distributed gateways are physically separated gateway devices (including gateway 213 and 223) (*plurality of gateway devices comprise a plurality of physically...separated gateway devices*).



EX-1004 FIG. 2 (annotated).

163. *Secer* stated, “Each of the distributed gateways may, for example, be any suitable processor-based device...” EX-1004 9:13-15. *Secer* also disclosed that gateways may be in different geographic locations. EX-1004 8:57-60. Because *each gateway* is a separate device in a geographic location separate from other gateways, *Secer* disclosed the gateways are *physically separated gateway devices*.

164. Moreover, *Secer* depicted the gateways are *logically separated gateway devices* in FIG. 2. EX-1004 FIG. 2.

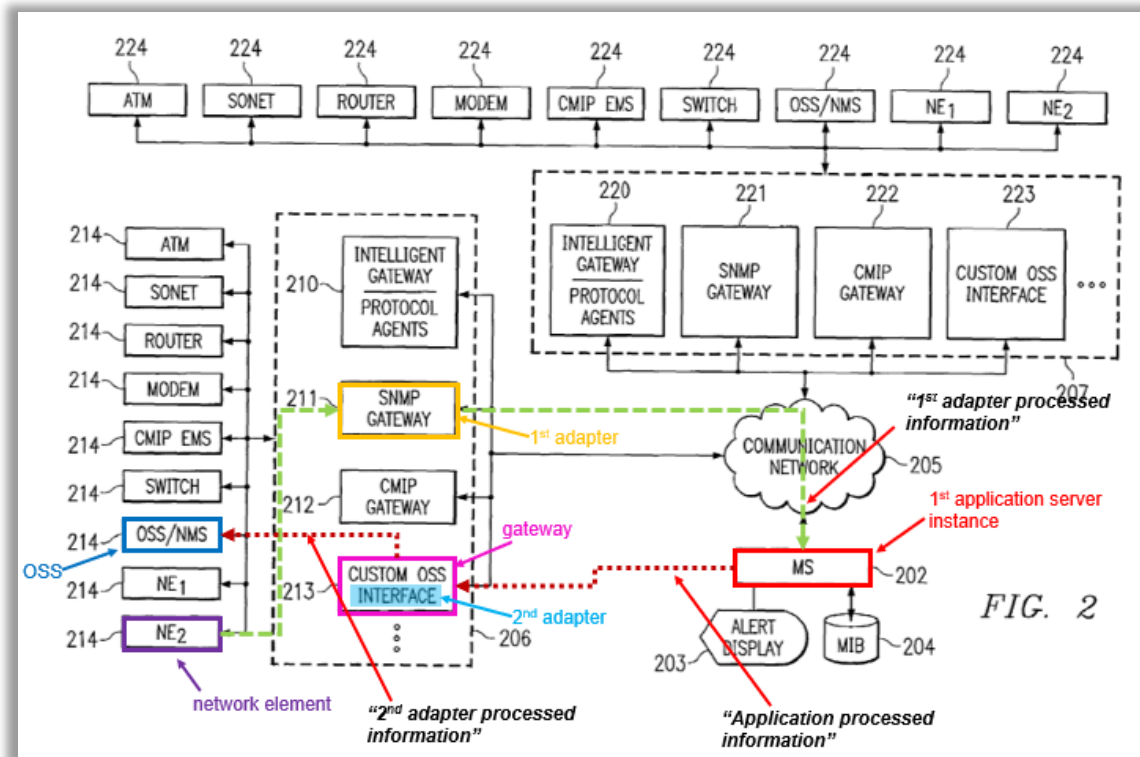
165. Thus, *Secer* disclosed this limitation.

**Claim 9**

[9] *The method of claim 1, wherein the gateway device is a physically and logically separate machine from the first application server instance.*

166. Secer disclosed this limitation. Secer’s FIG. 2 disclosed gateways 213 (gateway device is a physically and logically separate machine) are coupled to MS 202 over the communication network and separate machines from the MS 202 (from the first application server instance). EX-1004 FIG. 1, 6:33-38, 6:54-57, 6:64-7:1, 18:12-15 (“client/server environment”).

167. For example, the gateways (gateway device) (e.g., gateways 210-213) of FIG. 2 are connected to communication network 205 and MS 202 (first application server instance) is connected to communication network 205.



EX-1004 FIG. 2 (annotated).

168. *Secer* further stated, “Each of the distributed gateways may, for example, be any suitable processor-based device.” EX-1004 9:13-15. *Secer* also stated “[t]he gateways are distributed from MS 202.” EX-1004 10:12.

169. *Secer* further disclosed that a gateway process ran on a gateway device and stated, the “gateway process (e.g., software executing on the gateway) and the gateway hardware (e.g., the processor-based device on which the gateway process is implemented).” EX-1004 11:5-7. A gateway process that ran on a gateway “device” would be logically separate from MS 202 (*first application server instance*) because it was located in an independently separate “device.”

170. Thus, *Secer* disclosed this limitation.

### **Claim 10**

***[10] The method of claim 1, further comprising converting, by the first adapter, a message associated with the first communication protocol to a protocol specific message associated with the first application server instance.***

171. *Secer* disclosed this limitation. *Secer* depicted a gateway having adapter functionality (*first adapter*) that communicated with a network element in a first communication protocol (e.g., SNMP, CMIP, etc.) (*a message associated with the first communication protocol*) and further communicated with MS 202 (*converting... to a protocol specific message associated with the first application server instance*) over a communication network 205. EX-1004 8:62-9:17.

Communication network 205 operated using different protocols (e.g., IP) from that used by the network elements (*first communication protocol*) and required conversion. EX-1004 8:43-56. Further, the MS 202 also operated using a different protocol, as evidenced by the gateway translations (*converting*). EX-1004 7:16-19 (gateways “are responsible for protocol translations, for such protocols as SNMP and CMIP”).

172. Thus, *Secer* disclosed this limitation.

### **Claim 11**

**[11] *The method of claim 1, further comprising processing, by the gateway device, a function associated with the application server processed information.***

173. *Secer* disclosed this limitation. *Secer* disclosed a custom OSS interface gateway 213 (*gateway device*) that received and processed a management behavior object that defined a management behavior (e.g., need to respond to particular trap messages or perform defined polling activities) (*processing... a function associated with the application server processed information*) for sending to the OSS.

174. *Secer* disclosed that the “management behavior” described the gateway function behavior that is responsive to a particular trap message or management behavior of the gateway for polling network elements. EX-1004 9:49-10:4. Based on the “management behavior” (*application server processed*

*information*) the gateways (*gateway device*) operated in accordance with the “management behavior” to manage/recover management of the network elements. EX-1004 9:62-10:4.

175. Thus, *Secer* disclosed this limitation.

### **Claim 12**

**[12] *The method of claim 1, wherein the event information relates to a configuration of the network element.***

176. *Secer* disclosed this limitation. *Secer* disclosed gateways and MS 202 collected trap messages, events, and poll information (*event information*) to gather information about various operational characteristics of NEs (*...relates to a configuration of the network element*) from the network elements. EX-1004 2:21-25, 9:3-5, 14:35-42, 9:13-18. *Secer* also disclosed that the MS was “implemented...for managing... network elements.” EX-1004 1:55-60. The management of network elements included the configuration of the network elements. §V.1.

177. Thus, *Secer* disclosed this limitation.

### **Claim 13**

**[13] *The method of claim 1, further comprising executing the first adapter and the second adapter on one or more virtual machines.***

178. *Secer* disclosed this limitation. *Secer* disclosed that distributed gateways (*first adapter and second adapter*) (see [1ai], [1cii]) are remote from and

connected MS 202. EX-1004 8:57-60 (stating “gateway group 206 may be implemented at one geographic location of managed network and group 207 may be implemented at another geographic location.”). *Secer* also disclosed the gateways included “gateway process[es] (e.g., software executing on the gateway)” and, as shown in FIG. 1, multiple gateway processes run on the MS 20 in *virtual machines*. EX-1004 11:5-8.

179. Therefore, it is my opinion that a POSITA understood that it was common to logically partition software code across physical machines, and thus it was merely a design choice to implement the adapter functionality software virtually. EX-1005 ¶32. Thus, a POSITA would have found it obvious to implement multiple gateways on a single machine like those disclosed in *Secer*’s FIG. 1.

180. Thus, *Secer* disclosed and/or rendered this limitation obvious.

#### **Claim 14**

**[14] *The method of claim 1, wherein the first adapter and the second adapter are configured to communicate with the first application server instance over a remote method invocation interface.***

181. *Secer* disclosed this limitation. *Secer* disclosed geographically distributed gateways (*first adapter and second adapter*) that are coupled to and communicated with MS 202 (*configured to communicate with the first application*

*server instance*) over a network (*remote method invocation interface*) as discussed with reference to claim [1]. EX-1004 9:17-18, 9:22-26, EX-1004 8:57-60.

182. Because the gateways were remote from MS, they required an interface to send network element data (*event information*) and receive the responsive management behavior objects (*application process information*) over the communication network with the MS. Thus, *Secer* disclosed a *remote method invocation interface*.

183. Thus, *Secer* disclosed this limitation.

### **Claim 15**

**[15] *The system of claim 3, wherein the event information is associated with a configuration of the network element.***

184. *Secer* disclosed this limitation for the reasons discussed in claim 12 above. See [12].

### **Claim 16**

**[16] *The system of claim 3, wherein the first application server instance comprises a performance manager component configured to collect performance data from a plurality of network elements respectively associated with a plurality of first adapters including the first adapter.***

185. *Secer* disclosed this limitation. *Secer* disclosed “performance management” by MS (*performance manager component*) that is based on the “collection of data from the network elements” including performance information

*(collect performance data from a plurality of network elements respectively associated with a plurality of first adapters including the first adapter).*

186. For example, the network element data included “information regarding the performance of network element” and “operational characteristics of such network element(s)” (*performance data*) collected by the gateways (*first adapters*) then transmitted to the MS 202 (*first application server instance*). EX-1004 2:36-61; 9:13-18; 9:22-26; 10:21-24; 1:57-60, 2:36-61 (performance of network elements included “workload,” available memory capacity, etc.”). *Secer’s* performance management occurred in MS 202 because the data from the plurality of network elements is collected and processed in MS 202 to generate and “push” management behavior objects to the appropriate gateway and network elements. EX-1004 9:17-18, 9:66-10:8, 10:21-24; *see also* [1]. *Secer* disclosed multiple gateways (*first adapters*) managing multiple network elements (*plurality of network elements respectively associated with a plurality of first adapters*). EX-1004 FIG. 2.

187. Thus, *Secer* disclosed this limitation.

### **Claim 17**

***[17] The system of claim 16, wherein the performance manager component is further configured to deliver at least a subset of the performance data to one or more of the plurality of network elements.***

188. *Secer* disclosed and/or rendered this limitation obvious. *Secer* described the *performance manager component is further configured to deliver at least a subset of the performance data to one or more of the plurality of network elements* with reference to claim 16. *See* [16].

189. As explained above, *Secer* disclosed the *performance data from a plurality of network elements*. *See* [16]. This performance data included, e.g., load on network elements (traffic, CPU usage, workload, etc.) and other operational characteristic information indicating the NE performance. EX-1004 6:41-49; 2:36-61 (performance of network elements included “workload,” available memory capacity, etc.”). As also explained above, *Secer* disclosed MS distributing management behavior objects to gateways and network elements. *See* [16]. It is my opinion that a POSITA understood that such behavior management objects would include data from the originating message in, e.g., selecting a new network element to take over from a failed element, to reconfigure an element in response to performance issues, and rerouting traffic in the network by reconfiguring network elements. §V.1. Such data would include the original configuration parameters or portions thereof, e.g., network element associations, identifications of traffic routes, fault or trap messages (e.g., high CPU utilization, device reboot, interface down, low memory), performance metrics obtained through polling (e.g.,

workload levels, bandwidth utilization, available storage capacity), and device state information (e.g., operational status, protocol-specific health checks).

190. Thus, *Secer* disclosed and/or rendered this limitation obvious.

### **Claim 18**

**[18] *The system of claim 3, wherein the first communication protocol and the second communication protocol comprise one or more communication protocols associated with at least one of extensible markup language, simple network management protocol, common object request broker architecture, or transaction language 1.***

191. *Secer* disclosed this limitation for the reasons discussed in claim 6.

*See* [6].

### **Claim 19**

**[19] *The system of claim 3, wherein at least one of the first adapter or the second adapter are executed on one or more virtual machines.***

192. *Secer* disclosed this limitation for the reasons discussed in claim 13.

*See* [13].

### **Claim 20**

**[20] *The system of claim 3, wherein the first adapter and the second adapter are configured to communicate with the first application server instance over a remote method invocation interface.***

193. *Secer* disclosed this limitation for the reasons discussed in claim 14.

*See* [14].

### **Claim 21**

***[21] The system of claim 3, wherein the load balancing component is configured to select the first application server instance based on a determination that the first application server instance has a lowest processing load of the plurality of application server instances.***

194. *Secer* disclosed this limitation for the reasons discussed in claim 5.

*See* [5].

**Claim 22**

***[22] The system of claim 3, wherein the plurality of gateway devices comprises a plurality of physically or logically separated gateway devices.***

195. *Secer* disclosed this limitation for the reasons discussed in claim 8.

*See* [8].

## **CONCLUSION AND DECLARATION**

The findings and opinions set forth in this declaration are based on my research and analysis to date. I may continue my examinations in view of additional documents or other factual evidence over the course of this proceeding that may necessitate supplementing and/or refining my opinions. I reserve the right to add to, alter, or delete my opinions and my Declaration upon discovery of additional information. I also reserve the right to make such changes as necessary.

In signing this declaration, I understand that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I acknowledge that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

I declare that all statements made herein on my own knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

[SIGNATURE ON FOLLOWING PAGE]

Dated: 8/31/2025

By: *Douglas C. Schmidt*

Dr. Douglas C. Schmidt

## APPENDIX A – MATERIALS RELIED UPON

Exhibit	Brief Description
1001	U.S. Patent 8,782,282 (“the ’282 Patent”)
1002	Prosecution History for U.S. Patent 8,782,282
1003	Intentionally Left Blank
1004	U.S. Patent No. 7,209,968 (“ <i>Secer</i> ”), issued April 24, 2007, filed May 29, 2001
1005	U.S. Patent Pub. No. 2003/0177411 (“ <i>Dinker</i> ”), published September 18, 2003, filed March 12, 2002
1006	WIPO Publication WO 00/08823 (“ <i>Keene</i> ”), published February 17, 2000
1007	U.S. Patent Pub. No. 2003/0028654 (“ <i>Abjanic</i> ”), published February 6, 2003, filed August 10, 2001
1008	U.S. Patent No. 6,718,377 (“ <i>Bischoff</i> ”), issued April 6, 2004, filed March 15, 2000
1009	U.S. Patent No. 5,742,762 (“ <i>Scholl</i> ”), issued April 21, 1998
1010	U.S. Patent No. 7,043,525 (“ <i>Tuttle</i> ”), issued May 9, 2006, filed December 14, 2001
1011	U.S. Patent No. 6,470,394 (“ <i>Bamforth</i> ”), issued October 22, 2002
1012	U.S. Patent Pub. No. 2004/0008717 (“ <i>Verma</i> ”), published January 15, 2004, filed July 12, 2002
1013	U.S. Patent 6,260,062 (“ <i>Davis</i> ”), issued July 10, 2001
1014	U.S. Patent Pub. No. 2003/0120502 (“ <i>Robb</i> ”), published June 26, 2003, filed April 23, 2002

**APPENDIX B – *CURRICULUM VITAE***

## Dr. Douglas Craig Schmidt

Dean of Computing, Data Sciences & Physics  
William & Mary  
Williamsburg, VA 23185

douglas.c.schmidt@wm.edu  
(TEL) 615-294-9573  
(WEB) [www.cs.wm.edu/~dcschmidt](http://www.cs.wm.edu/~dcschmidt)

### Educational Background

- **Ph.D. Computer Science**, summer 1994, University of California, Irvine  
Dissertation: “An Object-Oriented Framework for Experimenting with Alternative Process Architectures for Parallelizing Communication Subsystems.”  
Co-advisors: Dr. Tatsuya Suda and Dr. Richard W. Selby.
- **M.S. Computer Science**, summer 1990, University of California, Irvine, specializing in software engineering.
- **M.A. Sociology**, summer 1986, College of William and Mary, Williamsburg, Virginia  
Thesis: “A Statistical Analysis of University Resource Allocation Policies.”  
Advisor: Dr. Michael A. Faia.
- **B.A. Sociology**, summer 1984, College of William and Mary, Williamsburg, Virginia.

### Professional Experience

#### • Academic Positions

1. **1/25 – present: Dean of the School of Computing, Data Sciences, and Physics at William & Mary.** Report to the Provost and responsible for (1) uniting the school’s four areas (computer science, data science, applied science and physics) into a cohesive academic unit and growing their research, grant funding and doctoral program enrollment, (2) establishing a vision with strategic objectives to ensure the school becomes nationally known as an inclusive and innovative leader in teaching and research, and (3) supporting faculty in their research, teaching and service work; leading fundraising efforts and the financial management of the school; and building or strengthening its strategic partnerships.
2. **/17 – 4/24: Cornelius Vanderbilt Professor of Engineering at Vanderbilt University.** Received an endowed chair in recognition of my scholarship, intellect, and leadership in the field of computer science and computer engineering.
3. **1/03 – 4/24: Full Professor with tenure at Vanderbilt University.** Conducted research on patterns, optimizations, and experimental analysis of advanced generative software techniques that facilitate the development of distributed real-time and embedded middle-ware and model driven architectures, as well as prompt engineering and prompt patterns for large language models in the Department of Computer Science at Vanderbilt University.
4. **7/1/22 – 4/24: Associate Chair of Computer Science at Vanderbilt University.** Provide intellectual leadership within the CS department. Coordinate with CS Chair to assist in CS and CompE curriculum development and course staffing. Assist the faculty in building industry and federal programs for CS. Assist the Chair in mentoring junior CS faculty. Assist the EECS Chair in improving the ranking of the CS programs. Assist the Chair in increasing the quality, number, and online offerings of undergraduate and graduate student applications to the CS programs.
5. **7/1/18 – 6/30/22: Associate Provost of Research Development and Technologies at Vanderbilt University.** Develop cohesive and sustainable information technology (IT) services to advance research and scholarship across Vanderbilt’s ten schools and colleges; develop scalable storage and processing solutions by leveraging on-campus and cloud data storage services, as well as creating big data research cores and core-related services; and implement NIST 800-171 compliant IT services.
6. **8/1/18 – 6/30/22: Co-Director of the Data Science Institute at Vanderbilt University.** Facilitate highly innovative research and education initiatives that build on Vanderbilt University’s

current strengths, promote new collaborations, and establish a cohesive institutional framework that embraces Vanderbilt's diverse campus, while establishing the university as a leader in data science research and education.

7. **02/16 – 7/31/18: Associate Chair of Electrical Engineering and Computer Science (EECS) at Vanderbilt University.** Provide intellectual leadership within the EECS department. Coordinate with EECS Chair to assist in EE, CS, and CompE curriculum development and course staffing. Assist the faculty in building industry and federal programs for EECS. Assist the Chair in mentoring junior EECS faculty. Assist the EECS Chair in improving the ranking of the EECS programs. Assist the Chair in increasing the quality and number of undergraduate and graduate student applications to the EECS programs.
8. **12/04 – 1/16: Associate Chair of Computer Science and Engineering at Vanderbilt University.** Provide intellectual leadership within the CS program. Coordinate with EECS Chair to assist in CS and CompE (CS&E) curriculum development and course staffing. Assist the faculty in building industry and federal programs centered in CS&E and IT for EECS. Assist the Chair in mentoring junior CS&E faculty. Assist the EECS Chair in improving the ranking of the CS&E programs. Assist the Chair in increasing the quality and number of undergraduate and graduate student applications to the CS&E programs.
9. **7/11 – 7/13: Adjunct Professor of Software Engineering** in the Institute for Software Research in the School of Computer Science at Carnegie Mellon University.
10. **6/07 – 8/07: Visiting Professor at Trinity College Dublin.** Worked with Professor Vinny Cahill and the Distributed Systems Group at Trinity College on topics pertaining to service-oriented architectures and autonomic computing.
11. **8/99 – 2002: Associate Professor with tenure at University of California, Irvine.** Conducted research on patterns, implementation, and experimental analysis of object-oriented techniques that facilitate the development of high-performance, distributed real-time and embedded computing systems on parallel processing platforms running over high-speed networks and embedded system interconnects in the Department of Computer Engineering at the University of California, Irvine.
12. **6/99 – 8/99: Associate Professor with tenure at Washington University, St. Louis.** Conducted research on patterns, implementation, and experimental analysis of object-oriented techniques that facilitate the development of high-performance, distributed real-time and embedded computing systems on parallel processing platforms running over high-speed networks and embedded system interconnects in the Department of Computer Science and the Department of Radiology at Washington University in St. Louis.
13. **6/98 – 6/99: Associate Professor without tenure (early promotion) at Washington University, St. Louis.** Conducted research on patterns, implementation, and experimental analysis of object-oriented techniques that facilitate the development of high-performance, distributed real-time and embedded computing systems on parallel processing platforms running over high-speed networks and embedded system interconnects in the Department of Computer Science and the Department of Radiology at Washington University in St. Louis.
14. **8/94 – 6/98: Assistant Professor at Washington University, St. Louis.** Conducted research on object-oriented patterns and techniques for developing highly extensible, high-performance communication frameworks in the Department of Computer Science and the Department of Radiology at Washington University in St. Louis.
15. **3/91 – 8/94: Research Assistant at University of California, Irvine.** Developed object-oriented frameworks for multi-processor-based communication subsystems with Professor Tatsuya Suda at the University of California, Irvine.
16. **8/88 – 3/91: Research Assistant at University of California, Irvine.** Devised measurement-guided software development techniques for large-scale software systems with Professor Richard Selby at the University of California, Irvine.
17. **6/88 – 8/88: Research Assistant at University of California, Irvine.** Studied the impact of computing on end-users in forty U.S. city governments with Dr. John King and the URBIS project at the Public Policy Research Organization, University of California, Irvine.
18. **9/86 – 5/88: Teaching Assistant at University of California, Irvine.** Developed programming assignments, grading tools, and led recitation sessions for several undergraduate

Computer Science courses at the University of California, Irvine.

19. **1/85 – 8/86: Research Assistant at William & Mary.** Examined university resource allocation policies via statistical analysis under the direction of Dr. Michael Faia at the College of William and Mary, Williamsburg, Virginia.

- **Government and Federally-Funded Research & Development Positions**

1. **5/24 – 12/24: Director of Operational Test and Evaluation (DOT&E).** Reported to the Secretary of Defense and Congress and was responsible for assessing the effectiveness, suitability, survivability, and (when necessary) lethality of United States military systems.
2. **1/12 – 4/24: Visiting Scientist at Carnegie Mellon University's Software Engineering Institute (SEI).** Assist the SEI Director's Office in formulating the SEI's technology strategy for R&D projects and external relationships by aligning the expertise of the SEI technical staff to identify and respond to the needs of government sponsors, and partners and help the SEI shape future innovations in complex software-reliant systems.
3. **1/1/10 – 12/31/13: Member of the Air Force Scientific Advisory Board.** Worked on several studies related to Cyber-Situational Awareness and Sustaining Aging Aircraft.
4. **9/10 – 12/11: Deputy Director of Research and Chief Technology Officer at the Software Engineering Institute (SEI).** Lead the formulation of the SEI's technology strategy for R&D projects and external relationships by aligning the expertise of the SEI technical staff to identify and respond to the needs of sponsors, customers, and partners and help the SEI shape future innovations in complex software-reliant systems.
5. **07/05 – 8/10: Visiting Scientist at Carnegie Mellon University's Software Engineering Institute.** Assisted Linda Northrop and the Ultra-Large-Scale (ULS) Systems team to define the challenge problems, promising technology areas, and research roadmaps for the national R&D effort on building the software-reliant systems of the future that are likely to have billions of lines of code. This activity is defining a broad, multi-disciplinary research agenda for developing ULS systems of the future.
6. **3/02 – 12/02: Program Manager at DARPA.** Led the National effort on middleware as a Program Manager for over \$60 million dollars of funding at the DARPA Information Exploitation Office (IXO). Programs include Program Composition for Embedded Systems (PCES) and National Experimentation Platform for Hybrid and Embedded Systems (NEPHEST).
7. **9/01 – 3/02: Deputy Office Director at DARPA.** Served as the Deputy Director for the DARPA Information Technology Office (ITO), helping set and guide the National IT research and development agenda and manage programs on autonomous systems, network-centric command and control systems, combat systems, real-time avionics systems, distributed real-time and embedded systems, and augmented cognition for the U.S. Department of Defense.
8. **6/00 – 3/02: Program Manager at DARPA.** Led the National effort on middleware as a Program Manager for over \$60 million dollars of funding at the DARPA Information Technology Office (ITO). Programs included the Program Composition for Embedded Systems (PCES).
9. **6/01 – 6/02: Co-chair for the Software Design and Productivity (SDP) Coordinating Group.** The SDP Coordinating Group formulates the multi-agency research agenda in fundamental software design for the Federal government's Networking and Information Technology Research and Development (NITR&D) Program, which is the collaborative IT research effort of the major Federal science and technology agencies.

- **Industry Positions**

1. **4/13 – 2/18: Member of the Board of Directors at Real-Time Innovations (RTI).** Work with the CEO and other members of the Board of Directors of RTI to help assess company technical and business strategy.
2. **06/09 – 8/10: Chief Technology Officer for Zircon Computing.** Assisted in the strategic direction of Zircon Computing technology development in the areas of adaptive distributed computing middleware for high-performance and real-time applications. Help to formulate the technology strategy for open-source middleware platforms, R&D partnerships, and external relationships.
3. **10/06 – 5/09: Chief Technology Officer for PrismTechnologies.** Assisted in the strategic di-

rection of PrismTechnologies technology development in the areas of open-source middleware platforms and model-driven tools. Help to formulate the technology strategy for open-source middleware platforms and model-driven tools, R&D partnerships, and external relationships.

4. **6/90 – 11/90: Member of the Technical Staff at Independent Technologies.** Worked as a software engineer for Independence Technologies, which was one of the largest suppliers of enterprise-level TUXEDO systems, providers of professional services, and developers of management and connectivity software to support OLTP environments.
5. **Summer of 87: Technical Intern.** Worked with Dr. Peter G. W. Keen at the International Center for Information Technology, Washington D.C. on various projects, including software productivity, videotex, and smartcards.
6. **Summer of 86: Statistical Programmer.** Programmed SPSS and SAS applications for the “Justice Delayed” project under the direction of Dr. Gene Flango at the National Center for State Courts, Williamsburg, Virginia.

## Publications

### In Print

#### • Refereed Journal Publications

- J139 Douglas C. Schmidt, “The Coming Commoditization of Computational Thinking,” *Communications of the ACM*, 2025, to appear.
- J138 Douglas C. Schmidt, “Software Testing in the Generative Artificial Intelligence Era: A Practitioner’s Playbook,” *IEEE Computer*, July 2025, pp. 147–152.
- J137 Ashraf Elnashar, Jules White, and Douglas C. Schmidt, “Enhancing Structured Data Generation with GPT-4o Evaluating Prompt Efficiency Across Prompt Styles,” *Frontiers in Artificial Intelligence*, March 25th, 2025, Volume 8, pp. 1–13.
- J136 John E. Robert, James Ivers, Douglas C. Schmidt, Ipek Ozkaya, Shen Zhang, “The Future of Software Engineering and Acquisition with Generative AI,” *STSC CrossTalk, The Journal of Defense Software Engineering*, Volume 37, Number 2, May 2024.
- J135 Anita Carleton, Douglas C. Schmidt, Forrest Shull, John Robert, and Ipek Ozkaya, “Five Critical Challenges for Software and AI Engineering,” *STSC CrossTalk, The Journal of Defense Software Engineering*, Volume 37, Number 1, pp. 32–43, February 2024.
- J134 Douglas C. Schmidt, Jesse Spencer-Smith, Quchen Fu, and Jules White, “Towards a Catalog of Prompt Patterns to Enhance the Discipline of Prompt Engineering,” *Ada User Journal (AUJ)*, Volume 44, Number 2, pp. 220–227, September 2023.
- J133 Yu Yao, Maria Powell, Jules White, Jian Feng, Quchen Fu, Peng Zhang, and Douglas C. Schmidt, “A Multi-stage Diagnosis Strategy based on Transfer Learning for a Class of Rare Laryngeal Movement Disorders,” the Elsevier *Computers in Biology and Medicine* journal, 166, pp. 1–12, 2023.
- J132 Peng Zhang, Adair Kelly, Douglas C Schmidt, and Jules White, “Design Pattern Recommendations for Building Decentralized Healthcare Applications,” *Frontiers in Blockchain*, Volume 6, pp 1–18, 2023.
- J131 Quchen Fu, Ramesh Chukka, Keith Achorn, Thomas Atta-fosu, Deepak R. Canchi, Zhongwei Teng, Jules White, and Douglas C. Schmidt. “Deep Learning Models on CPUs: A Methodology for Efficient Training,” *Journal of Machine Learning Theory, Applications and Practice*, Vol. 1, pp 45–82, 2023.
- J130 Quchen Fu, Zhongwei Teng, Marco Georgaklis, Jules White, and Douglas C. Schmidt, “NL2CMD: An Updated Workflow for Natural Language to Bash Commands Translation,” *The Journal of Machine Learning Theory, Applications and Practice*, Vol. 1, pp 1–38., 2022.
- J129 Peng Zhang, Christopher Fonnesbeck, Douglas C. Schmidt, Jules White, Samantha Kleinberg, Shelagh A. Mulvaney, “Understanding Barriers to Self-Management in Type 1 Diabetes Using Machine Learning and Momentary Assessment,” the *JMIR Journal of mHealth and uHealth*, Vol 10., No 5., March 2022.
- J128 Summer Weber, Elyse Shearer, Shelagh Mulvaney, Douglas C. Schmidt, Chris Thompson, Jes-

- sica Jones, Haseeb Ahmad, Martina Coe, and Pam Hull, "Prioritization of Features for Mobile Phone Applications for Families in a Federal Nutrition Program for Low-income Women, Infants, and Children: User-Centered Design Approach," *JMIR Formative Research*, Vol 5., No 7., July 2021.
- J127 Alex Roehrs, Cristiano A. da Costa, Rodrigo R. Righi, Andre H. Mayer, Valter F. da Silva, Jose R. Goldim, and Douglas C. Schmidt, "Integrating Multiple Blockchains to Support Distributed Personal Health Records," the *SAGE Health Informatics Journal*, April, 2021.
- J126 Zhongwei Teng, Peng Zhang, Xiao Li, William Nock, Denis Gilmore, Marcelino Rodriguez-Cancio, Jules White, Jonathan C. Nesbitt, Douglas C. Schmidt, "Authentication and Integration Approaches for mHealth Apps from a Usability View," the journal *Advances in Electrical and Electronic Engineering*, North America, 19, March, 2021.
- J125 Scott Eisele, Aron Laszka, Douglas C. Schmidt, and Abhishek Dubey, "The Role of Blockchains in Multi-Stakeholder Transactive Energy Systems," the journal *Frontiers in Blockchain: Emerging Technologies and Blockchain in Action: Applications in Supply Chain Management and Energy*, volume 3, December, 2020, pps. 1-55.
- J124 Peng Zhang, Chris Downs, Nguyen Thanh Uyen Le, Cory Martin, Paul Shoemaker, Clay Wittwer, Luke Mills, Liam Kelly, Stuart Lackey, Douglas C. Schmidt, Jules White, "Towards Patient-centered Stewardship of Research Data and Research Participant Recruitment with Blockchain Technology," the *Frontiers in Blockchain special selection on Non-Financial Blockchain*, 2020, volume 3, pps. 1-32.
- J123 Yao Pan, Fangzhou Sun, Jules White, Douglas C. Schmidt, Jacob Staples, Lee Krause, and Zhongwei Teng, "Detecting Web Attacks with End-to-End Deep Learning," the Springer *Journal of Internet Services and Applications*, 2019, volume 10, number 16, pps. 1-22.
- J122 Shelagh Mulvaney, Lori Laffel, Korey Hood, Cindy Lybarger, Sarah Vaala, and Douglas C. Schmidt, "A Mobile App Identifies Momentary Psychosocial and Contextual Factors Related to Mealtime Self-Management in Adolescents with Type 1 Diabetes," *Journal of the American Medical Informatics Association*, Oxford University Press, 2019, Volume 26, Number 12, pps. 1627-1631.
- J121 Maria E. Powell, Marcelino Rodriguez Cancio, David Young, William Nock, Beshoy Abdelmessih, Amy Zeller, Irvin Perez Morales, Peng Zhang, C Gaelyn Garrett, Douglas Schmidt, Jules White, and Alexander Gelbard, "Decoding Phonation with Artificial Intelligence (DEP AI): Proof of Concept," the *Laryngoscope Investigative Otolaryngology* journal, Wiley-Blackwell, Volume 4, Issue 3, 2019, pps. 328-334.
- J120 Alex Roehrs, Cristiano Andre da Costa, Rodrigo da Rosa Righi, Valter Ferreira da Silva, Jose Roberto Goldim, and Douglas C. Schmidt, "Analyzing the Performance of a Blockchain-based Personal Health Record Implementation," the *Journal of Biomedical Informatics*, Elsevier, volume 92, 2019.
- J119 Peng Zhang, Breck Stodghill, Cory Pitt, Cavan Briody, Douglas C. Schmidt, Jules White, Alan Pitt, and Kelly Aldrich, "OpTrak: Tracking Opioid Prescriptions via Distributed Ledger Technology," the *International Journal of Information Systems and Social Change (IJISSC)*, Special Issue On: Blockchain Technology: Platforms, Tools, and Use Cases, IGI Global, Volume 10, Number 2, 2019.
- J118 Peng Zhang, Jules White, Douglas C. Schmidt, Gunther Lenz, S. Trent Rosenbloom, "FHIR-Chain: Applying Blockchain to Securely and Scalably Share Clinical Data," the Elsevier *Computational and Structural Biotechnology Journal – Blockchain and Distributed Ledger Technologies in Biology, Medicine, and eHealth Special Issue*, Volume 16, July 2018, pp 267– 278.
- J117 Shelagh A Mulvaney, Sarah Vaala, Korey K Hood, Cindy Lybarger, Rachel Carroll, Laura Williams, Douglas C Schmidt, Kevin Johnson, Mary S Dietrich, and Lori Laffel, "Mobile Momentary Assessment and Bio-Behavioral Feedback for Adolescents with Type 1 Diabetes: Feasibility, Engagement Patterns, and Relation with Blood Glucose Monitoring," *Journal of Diabetes Technology and Therapeutics*/EM, Vol 20, No. 7, July 2018, pp 465–474.
- J116 Subhav Pradhan, Abhishek Dubey, Shweta Khare, Saideep Nannapaneni, Aniruddha Gokhale, Sankaran Mahadevan, Douglas C Schmidt, Martin Lehofer, "CHARIOT: A Holistic, Goal Driven Orchestration Solution for Resilient IoT Applications," the *ACM Transactions on Cyber-Physical*

Systems, Vol 2, No. 3, July 2018, pp 1-37.

- J115 Hull PC, Emerson JS, Quirk ME, Canedo JR, Jones JL, Vylegzhanina V, Schmidt D, Mulvaney S, Beech B, Husaini BH, "A Smartphone App for Families With Preschool-Aged Children in a Public Nutrition Program: Prototype Development and Beta-Testing," *Journal of Medical Internet Research (JMIR): mHealth and uHealth*, Vol 5, No. 8, August, 2017, pp 1–19.
- J114 Yao Pan, Jules White, Douglas C. Schmidt, Ahmed Elhabashy, Logan Sturm, Jaime Camelio, and Christopher Williams, "Taxonomies for Reasoning About Cyber-physical Attacks in IoT- based Manufacturing Systems," Special Issue on Advances and Applications in the Internet of Things, edited by Vicente Garcia Diaz, *International Journal of Interactive Multimedia and Artificial Intelligence*, volume 4, number 3, 2017, pp. 45-54.
- J113 Gordon Blair, Douglas C. Schmidt, and Chantal Taconet, "Middleware for Internet Distribution in the Context of Cloud Computing and the Internet of Things," *Springer Journal Annals of Telecommunications*, April 2016, Volume 71, Issue 3, pp. 87-92.
- J112 Yu Sun, Jules White, Sean Eade, and Douglas C. Schmidt, "ROAR: A QoS-Oriented Modeling Framework for Automated Cloud Resource Allocation and Optimization", the *Journal of Systems and Software*, Elsevier, volume 116, issue C, June 2016 pp. 146.161.
- J111 Nick Guertin, Brian Womble, Paul Bruhns, Douglas C. Schmidt, Adam Porter, and Bill Antypas, "Management Strategies for Software Infrastructure in Large-Scale Cyber-Physical Systems for the US Navy," *Cutter IT Journal*, Vol. 28, No. 5, May 2015, pp. 14-18.
- J110 Jules White, Josi A. Galindo, Tripti Saxena, Brian Dougherty, David Benavides, Douglas C. Schmidt, "Evolving Feature Model Configurations in Software Product Lines," *Journal of Systems and Software*, Volume 87, 2014, pp. 119-136.
- J109 Akram Hakiri, Aniruddha S. Gokhale, Pascal Berthou, Douglas C. Schmidt, Thierry Gayraud, *Software-Defined Networking: Challenges and Research Opportunities for the Future Internet*, *Journal of Computer Networks*, Volume 75, 2014, pp. 453-471.
- J108 Hamilton Turner, Brian Dougherty, Jules White, Jonathan Preston, Russell Kegley, Douglas C. Schmidt, and Aniruddha Gokhale, "DRE System Performance Optimization with the SMACK Cache Efficiency Metric," *Elsevier Journal of Systems and Software*, Volume 98, 2014, pp. 25-43.
- J107 Akram Hakiri, Pascal Berthou, Aniruddha Gokhale, Douglas C. Schmidt, Gayraud Thierry, "Supporting SIP-based Data Distribution Service End-to-End QoS in WANs," the *Elsevier Journal of Systems and Software*, Volume 95, September 2014, pp. 100-121.
- J106 Jules White, Douglas C. Schmidt, and Mani Golparvar-Fard, "Applications of Augmented Reality," *IEEE Proceedings Special issue on Applications of Augmented Reality*, Vol 102, No. 2., February 2014, pp. 120-123.
- J105 Nickolas H. Guertin, Paul Bruhns, Douglas C. Schmidt, and Adam Porter, "Experiences Using Online War Games to Improve the Business of Naval Systems Acquisition," *Cutter Journal of Information Technology Management*, Vol. 27, No. 5, May 2014, pp 13-18.
- J104 Michael McLendon, Bill Scherlis, and Douglas C. Schmidt, "Addressing Software Sustainment Challenges for the DoD," *STSC CrossTalk, The Journal of Defense Software Engineering special issue on Legacy Systems Software*, January, volume 27, number 1, 2014, pp. 27-32.
- J103 Akram Hakiri, Pascal Berthou, Aniruddha Gokhale, Douglas C. Schmidt, Gayraud Thierry, "Supporting End-to-end Scalability and Real-time Event Dissemination in the OMG Data Distribution Service over Wide Area Networks," *Elsevier Journal of Systems and Software*, volume 86, number 10, October, 2013, pp. 2574-2593.
- J102 William Otte, Aniruddha Gokhale, and Douglas C. Schmidt, "Efficient and Deterministic Application Deployment in Component-based, Enterprise Distributed, Real-time, and Embedded Systems," *Elsevier Journal of Information and Software Technology*, Vol. 55, No. 2, Feb 2013, 475-488.
- J101 Dr. Douglas Schmidt, Anita Carleton, Erin Harper, Mary Ann Lapham, Ipek Ozkaya, and Linda Parker Gates, "What Will It Take to Achieve Agility-at-Scale?," *Cutter IT Journal*, edited by Hillel Glazer, November 2012, pp. 34-39.

- J100 Brian Dougherty, Jules White, and Douglas C. Schmidt, "Model-driven Auto-scaling of Green Cloud Computing Infrastructure," the Elsevier International Journal of Future Generation Computing Systems, Special Issue on Green Computing Systems, Volume 28, Number 2, February, 2012 Pages 371-378.
- J99 Joe Hoffert, Douglas C. Schmidt, and Aniruddha Gokhale, "Evaluating Timeliness and Accuracy Trade-offs of Supervised Machine Learning for Adapting Enterprise DRE Systems in Dynamic Environments," the International Journal of Computational Intelligence Systems, Volume 4, Number 5, September-October 2011, pp. 806-816.
- J98 James Hill, Pooja Varshneya, and Douglas C. Schmidt, "Evaluating Distributed Real-time and Embedded System Test Correctness using System Execution Traces," Central European Journal of Computer Science, Volume 1, Number 2, August 2011, pp. 167-184.
- J97 Brian Dougherty, Jules White, and Douglas C. Schmidt, "Automated Software and Hardware Evolution Analysis for Distributed Real-time and Embedded Systems," the Central European Journal of Computer Science, Volume 1, Number 1, July 2011, pp. 36-57.
- J96 James Hill, Hunt Sutherland, Paul Stodinger, Thomas Silveria, Douglas C. Schmidt, John Slaby, and Nikita Visnevski, "OASIS: An Architecture for Dynamic Instrumentation of Enterprise Distributed Real-time and Embedded Systems," the International Journal of Computer Systems Science and Engineering, Special Issue on Real-time Systems, Volume 26, Number 6, November 2011, pp. 413-430.
- J95 Jules White, Brian Dougherty, Chris Thompson, Douglas C. Schmidt, "ScatterD: Spatial Deployment Optimization with Hybrid Heuristic/Evolutionary Algorithms," ACM Transactions on Autonomous and Adaptive Systems Special Issue on Spatial Computing, Volume 6 Issue 3, September 2011, 18:1-8:25.
- J94 Jules White, Chris Thompson, Hamilton Turner, Brian Dougherty, and Douglas C. Schmidt, WreckWatch: Automatic Traffic Accident Detection and Notification with Smartphones, Journal of Mobile Networks and Applications, Volume 16 Issue 3, July 2011, Pages 285-303.
- J93 Jules White, Brian Dougherty, Richard Schantz, Douglas C. Schmidt, Adam Porter, and Angelo Corsaro, "R&D Challenges and Solutions for Highly Complex Distributed Systems: a Middleware Perspective," the Springer Journal of Internet Services and Applications special issue on the Future of Middleware, Volume 2, Number 3, December 2011, pp. 1-8.
- J92 Joe Hoffert, Aniruddha Gokhale, and Douglas C. Schmidt, "Autonomic Adaptation of Publish/Subscribe Middleware in Dynamic Environments," the International Journal of Adaptive, Resilient and Autonomic Systems (IJARAS), 2(4), 1-24, October-December 2011, pp. 1-24.
- J91 Joe Loyall, Matt Gillen, Aaron Paulos, Larry Bunch, Marco Carvalho, James Edmondson, Douglas C. Schmidt, Andrew Martignoni, and Asher Sinclair, "Dynamic Policy-Driven Quality of Service in Service-Oriented Information Management Systems," Wiley journal on Software: Practice and Experience, December 2011, volume 41, number 12, pp. 1459-1489.
- J90 Michael Stal, Douglas C. Schmidt, and Will Otte, "Efficiently and Transparently Automating Scalable On-demand Activation and Deactivation of Services with the Activator Pattern," Software: Practice and Experience, special issue on Pattern Languages: Addressing Challenges, Edited by Mohamed Fayad and Shivanshu Singh, volume 41, number 10, October 2011, Wiley and Sons, pp. 1-16.
- J89 Brian Dougherty, Jules White, Douglas C. Schmidt, Russell Kegley, and Jonathan Preston, "Deployment Optimization for Embedded Flight Avionics Systems," STSC CrossTalk, The Journal of Defense Software Engineering, November/December, volume 24, number 6, 2011, pp. 1-8.
- J88 Brian Dougherty, Daniel Guymon, Douglas C. Schmidt, and Jules White, "Overcoming Cellular Connectivity Limitations with M2Blue Autonomic Distributed Data Caching," Autonomic Computing for Computer Society of India Magazine, CSI Communications, August 2011, pp. 12-15.
- J87 Friedhelm Wolf, Jaiganesh Balasubramanian, Sumant Tambe, Aniruddha Gokhale, and Douglas C. Schmidt, Supporting Component-based Failover Units in Middleware for Distributed Real-time and Embedded Systems, the Elsevier Journal of System Architectures (JSA): Embedded Systems Design, Special Issue on Real-time and Embedded Systems, May, 2011 pp. 597-613.

- J86 Jules White, David Benavides, Douglas C. Schmidt, Pablo Trinidad, Antonio Ruiz-Cortes, Brian Dougherty, "Automated Diagnosis of Feature Model Configurations," *The Journal of Systems and Software*, Special Issue on Software Product-lines, Volume 83, Issue 7, July, 2010, pp. 1094-1107.
- J85 Jules White, Brian Dougherty, and Douglas C. Schmidt, "ASCENT: An Algorithmic Technique for Designing Hardware and Software in Tandem, *IEEE Transactions on Software Engineering Special Issue on Search-based Software Engineering*, November/December 2010 (vol. 36 no. 6), pp. 838-851.
- J84 Joe Hoffert, Daniel Mack, and Douglas Schmidt, "Integrating Machine Learning Techniques to Adapt Protocols for QoS-enabled Distributed Real-time and Embedded Publish/Subscribe Middleware," *International Journal of Network Protocols and Algorithms (NPA): Special Issue on Data Dissemination for Large-scale Complex Critical Infrastructures*, Volume 2, Number 3, 2010, pp. 37-69.
- J83 James Hill, James Edmondson, Aniruddha Gokhale, and Douglas C. Schmidt, "Tools for Continuously Evaluating Distributed System Qualities," *IEEE Software*, July/August, 2010, Volume 27, Number 4, pp. 65-71.
- J82 James Edmondson and Douglas C. Schmidt, Multi-Agent Distributed Adaptive Resource Allocation (MADARA), *International Journal of Communication Networks and Distributed Systems (IJCNDS)*, Special Issue on: Grid Computing, Edited by Michal Wozniak and Krzysztof Walkowiak, Volume 5, Number 3, 2010, pp. 229-245.
- J81 Jules White, Christin Groba, Sibohan Clarke, Brian Dougherty, Chris Thompson, and Douglas C. Schmidt, "R&D Challenges and Solutions for Mobile Cyber-Physical Applications and Supporting Internet Services," *the Springer Journal of Internet Services and Applications*, Volume 1, Number 1, 2010, pp. 45-56.
- J80 Jules White, Jeff Gray, and Douglas C. Schmidt, "Constraint-based Model Weaving," *Transactions on Aspect-Oriented Software Development, Special Issue on Aspects and Model Driven Engineering*, eds. Robert France and Jean-Marc Jezequel, pp. 153-190, Volume 5560, Number 6, 2009.
- J79 Jules White, Harrison Strowd, and Douglas C. Schmidt, "Creating Self-healing Service Compositions with Feature Modeling and Microbooting," *the International Journal of Business Process Integration and Management (IJBPIIM)*, Special issue on Model-Driven Service-Oriented Architectures, Inderscience Publishers, pp. 35-46, Volume 4, Number 1, 2009.
- J78 Nishanth Shankaran, John Kinnebrew, Xenofon Koutsoukos, Chenyang Lu, Douglas C. Schmidt, and Gautam Biswas, "An Integrated Planning and Adaptive Resource Management Architecture for Distributed Real-time Embedded Systems," *IEEE Transactions on Computers*, Special Issue on Autonomic Network Computing, Special Issue on Autonomic Network Computing, volume 58, number 11, pp. 1485-1498, November 2009.
- J77 Jules White, Brian Dougherty, and Douglas C. Schmidt, "Selecting Highly Optimal Architectural Feature Sets with Filtered Cartesian Flattening," *the Journal of Software and Systems*, Special Issue on Design Decisions and Design Rationale in Software Architecture, Volume 82, Issue 8, pp. 1268-1284, August 2009.
- J76 Jules White, James Hill, Sumant Tambe, Jeff Gray, Aniruddha Gokhale, and Douglas C. Schmidt "Improving Domain-specific Language Reuse through Software Product-line Configuration Techniques, *IEEE Software Special Issue: Domain-Specific Languages and Modeling*, vol. 26, no. 4, pp. 47-53, July/August 2009.
- J75 Jules White and Douglas C. Schmidt, "Automating Deployment Planning with an Aspect Weaver," *IET Software Journal Special Issue on Domain-specific Aspect Languages*, Volume 3, Issue 3, p. 167-183, June 2009.
- J74 Shanshan Jiang, Yuan Xue, and Douglas C. Schmidt, "Minimum Disruption Service Composition and Recovery in Mobile Ad Hoc Networks, *Elsevier Computer Networks Journal, Special Issue on Autonomic and Self-Organizing Systems*, Volume 53, Issue 10, Pages 1649-1665, 2009.
- J73 Nishanth Shankaran, Douglas C. Schmidt, Xenofon D. Koutsoukos, Yingming Chen, and Chenyang Lu, "Design and Performance Evaluation of an Adaptive Resource Management Frame-

- work for Distributed Real-time and Embedded Systems,” *EURASIP Journal on Embedded Systems (EURASIP JES): Special issue on Operating System Support for Embedded Real-Time Applications*, Edited by Alfons Crespo, Ismael Ripoll, Michael Gonzalez Harbour, and Giuseppe Lipari, 2008, Pgs. 47-66.
- J72 Aniruddha Gokhale, Krishnakumar Balasubramanian, Jaiganesh Balasubramanian, Arvind Krishna, and George T. Edwards, Gan Deng, Emre Turkay, Jeffrey Parsons, and Douglas C. Schmidt, *Model Driven Middleware: A New Paradigm for Deploying and Provisioning Distributed Real-time and Embedded Applications*, *Elsevier Journal of Science of Computer Programming: Special Issue on Foundations and Applications of Model Driven Architecture (MDA)*, Edited by Mehmet Aksit, Volume 73, Issue 1, 1 September 2008, Pgs. 39-58.
- J71 Nishanth Shankaran, Xenofon Koutsoukos, Chenyang Lu, Douglas C. Schmidt, and Yuan Xue, “Hierarchical Control of Multiple Resources in Distributed Real-time and Embedded Systems,” *the Springer Real-time Systems Journal*, Volume 39, Numbers 1-3, August, 2008, pgs. 237-282.
- J70 Douglas C. Schmidt, Angelo Corsaro, and Hans Van’T Hag, “Addressing the Challenges of Tactical Information Management in Net-Centric Systems with DDS,” *CrossTalk special issue on Distributed Software Development*, pgs. 24-29, May 2008.
- J69 Jules White, Douglas C. Schmidt, Egon Wuchner, and Andrey Nechypurenko, “Automatically Composing Reusable Software Components for Mobile Devices,” *Journal of the Brazilian Computer Society (JBACS), Special Issue in Software Reuse: Methods, Processes, Tools and Experiences*, *Sociedade Brasileira de Computacao, Porto Alegre*, Volume 14, Number 1, pgs. 25-44, March, 2008.
- J68 Jules White, Douglas C. Schmidt, Andrey Nechypurenko, and Egon Wuchner, “Model Intelligence: an Approach to Modeling Guidance,” *UPGRADE Journal*, Volume 9, Number 2, pgs. 22-28, April 2008.
- J67 Douglas C. Schmidt, “Beyond Objects: Evaluating Technologies for Developing Distributed Systems,” *Computer Society of India Communications, Special Issue on OO Technologies*, edited by Debasish Jana, pgs. 30-37, February 2008.
- J66 Jules White, Douglas C. Schmidt, and Aniruddha Gokhale, “Simplifying Autonomic Enterprise Java Bean Applications via Model-driven Engineering and Simulation,” *The Journal of Software and System Modeling*, Volume 7, Number 1, February, 2008, pgs. 3-23.
- J65 Cemal Yilmaz, Adam Porter, Arvind S. Krishna, Atif Memon, Douglas C. Schmidt, and Aniruddha Gokhale, “Reliable Effects Screening: A Distributed Continuous Quality Assurance Process for Monitoring Performance Degradation in Evolving Software Systems,” *IEEE Transactions on Software Engineering* Vol. 33, No. 8, August 2007, pgs. 510-525.
- J64 Frank Buschmann, Kevlin Henning, and Douglas C. Schmidt, “Past, Present, and Future Trends in Software Patterns,” *IEEE Software special issue on Patterns*, Vol. 24, No. 4, July/August, 2007, pgs. 31-37.
- J63 Patrick Lardieri, Jaiganesh Balasubramanian, Douglas C. Schmidt, Gautam Thaker, Aniruddha Gokhale, and Tom Damiano, *A Multi-layered Resource Management Framework for Dynamic Resource Management in Enterprise DRE Systems*, *the Journal of Systems and Software: special issue on Dynamic Resource Management in Distributed Real-Time Systems*, editors C. Cavanaugh and F. Drews and L. Welch, Vol 80, Issue 7, July 2007, pgs. 984-996.
- J62 Janos Sztipanovits, John Bay, Larry Rohrbough, Shankar Sastry, Douglas C. Schmidt, Don Wilson, and Don Winters, “Escher: A New Technology Transitioning Model,” *IEEE Computer*, Vol. 40, No. 3, March 2007, pgs. 90-92.
- J61 Venkita Subramonian, Gan Deng, Christopher Gill, Jaiganesh Balasubramanian, Liang-Jui Shen, William Otte, Douglas C. Schmidt, Aniruddha Gokhale, and Nanbor Wang, “The Design and Performance of Component Middleware for QoS-enabled Deployment and Configuration of DRE Systems,” *Elsevier Journal of Systems and Software, Special Issue Component-Based Software Engineering of Trustworthy Embedded Systems*, pp. 668-677, volume 80, number 5, March, 2007.
- J60 Krishnakumar Balasubramanian, Jaiganesh Balasubramanian, Jeff Parsons, Aniruddha Gokhale, and Douglas C. Schmidt, “A Platform-Independent Component Modeling Language for

- Distributed Real-time and Embedded Systems,” Elsevier Journal of Computer and System Sciences, Volume 73, Number 2, March 2007, pgs. 171 - 185.
- J59 Adam Porter, Atif Memon, Cemal Yilmaz, Douglas C. Schmidt, and Bala Natarajan, “Skoll: A Process and Infrastructure for Distributed Continuous Quality Assurance, IEEE Transactions on Software Engineering, 2007, Vol. 33, No. 2, February 2007, pgs. 124-141.
- J58 Richard E. Schantz, Douglas C. Schmidt, Joseph P. Loyall, and Craig Rodrigues, “Controlling Quality-of-Service in Distributed Real-time and Embedded Systems via Adaptive Middleware,” the Wiley Software Practice and Experience journal special issue on Experiences with Auto-adaptive and Reconfigurable Systems, co-editors Mehmet Aksit, Zied Choukair, and Tzilla Elrad, vol. 36, no. 11-12, September 2006, pgs. 1189 - 1208.
- J57 Douglas C. Schmidt, “Model-Driven Engineering, IEEE Computer, Vol. 39. No. 2, February 2006, pp. 41-47.
- J56 Arvind S. Krishna, Aniruddha Gokhale, Douglas C. Schmidt, John Hatcliff, and Venkatesh Prasad Ranganat, “Towards Highly Optimized Real-time Middleware for Software Product- line Architectures,” ACM SIGBED Review, Volume 3, No. 1, January 2006, pgs. 12-16.
- J55 Gabor Madl, Sherif Abdelwahed, and Douglas C. Schmidt, “Verifying Distributed Real-time Properties of Embedded Systems via Graph Transformations and Model Checking, Real-time Systems Journal, vol 33, no. 1-3, pgs. 77-100, July 2006.
- J54 Cemal Yilmaz, Adam Porter, Atif Memon, Arvind S. Krishna, Douglas C. Schmidt, and Aniruddha Gokhale, Techniques and Processes for Improving the Quality and Performance of Open-Source Software, Software Process - Improvement and Practice Journal: Special Issue on Free/Open Source Software Processes, vol 11, no 2, May 2006, pgs. 163-176.
- J53 Krishnakumar Balasubramanian, Arvind S. Krishna, Emre Turkay, Jaiganesh Balasubramanian, Jeff Parsons, Aniruddha Gokhale, and Douglas C. Schmidt, “Applying Model-Driven Development to Distributed Real-time and Embedded Avionics Systems, the International Journal of Embedded Systems, special issue on Design and Verification of Real-Time Embedded Software, April 2005.
- J52 Arvind S. Krishna, Cemal Yilmaz, Adam Porter, Atif Memon, Douglas C. Schmidt, and Aniruddha Gokhale, “Distributed Continuous Quality Assurance Process for Evaluating QoS of Performance Intensive Software,” Studia Informatica Universalis, Volume 4, No. 1, pp. 53-72, March 2005.
- J51 Janos Sztipanovits, Gautam Biswas, Ken Frampton, Andy Gokhale, Larry Howard, Gabor Karsai, John Koo, Xenofon Koutsoukos, and Douglas C. Schmidt, “Introducing Embedded Software and Systems Education and Advanced Learning Technology in an Engineering Curriculum,” ACM Transactions in Embedded Computing Systems - Special Issue on Education, edited by Alan Burns and Alberto Sangiovanni-Vincentelli, Vol 4, No. 1, pp. 549-568, August 2005.
- J50 Arvind S. Krishna, Nanbor Wang, Balachandran Natarajan, Aniruddha Gokhale, Douglas C. Schmidt and Gautam Thaker, “CCMPerf: A Benchmarking Tool for CORBA Component Model Implementations”, The International Journal of Time-Critical Computing Systems, Springer, Vol. 29, No. 2-3, pp. 281-308, March-April 2005.
- J49 Chris Gill, Jeanna M. Gossett, David Corman, Joseph P. Loyall, Richard E. Schantz, Michael Atighetchi, and Douglas C. Schmidt, “Integrated Adaptive QoS Management in Middleware: An Empirical Case Study,” The International Journal of Time-Critical Computing Systems, Springer, Vol. 29, Nos. 2-3, pp. 101-130, March-April 2005.
- J48 Aniruddha Gokhale, Balachandran Natarajan, Douglas C. Schmidt, and Joseph Cross, “Towards Real-time Fault-Tolerant CORBA Middleware,” Cluster Computing: the Journal on Networks, Software, and Applications Special Issue on Dependable Distributed Systems, edited by Alan George, Volume 7, Number 4, October 2004.
- J47 Arvind S. Krishna, Cemal Yilmaz, Atif Memon, Adam Porter, Douglas C. Schmidt, Aniruddha Gokhale, and Balachandran Natarajan, “Preserving Distributed Systems Critical Properties: a Model-Driven Approach,” the IEEE Software special issue on the Persistent Software Attributes, Nov/Dec 2004.
- J46 Christopher Gill, Douglas C. Schmidt, Yamuna Krishnamurthy, Irfan Pyarali, Louis Mgeta, Yu-

- anfang Zhang, and Stephen Torri, "Enhancing the Adaptivity of Distributed Real-time and Embedded Systems via Standard QoS-enabled Dynamic Scheduling Middleware," the Journal of the Brazilian Computer Society (JCBS) special issue on Adaptive Software Systems, Volume 10, Number 1, pp. 19-30, 2004.
- J45 Douglas C. Schmidt, Aniruddha Gokhale, and Balachandran Natarajan, "Frameworks: Why They Are Important and How to Apply Them Effectively," ACM Queue magazine, Volume 2, Number 5, July/August 2004.
- J44 Douglas C. Schmidt, Richard Schantz, Aniruddha Gokhale, and Joe Loyall, "Middleware R&D Challenges for Distributed Real-time and Embedded Systems," ACM SIGBED Review, Volume 1, No. 1, April 2004.
- J43 Angelo Corsaro and Douglas C. Schmidt, "The Design and Performance of Real-time Java Middleware," Special Issue on Middleware for the IEEE Transactions on Parallel and Distributed Systems, guest editor Rachid Guerraoui, Volume 14, Number 11, November 2003.
- J42 Irfan Pyarali, Douglas C. Schmidt, and Ron Cytron, "Techniques for Enhancing Real-time CORBA Quality of Service," the IEEE Proceedings Special Issue on Real-time Systems, co-editors Yann-Hang Lee and C. M. Krishna, Volume 91, Number 7, July 2003.
- J41 Nanbor Wang, Douglas C. Schmidt, Aniruddha Gokhale, Christopher D. Gill, Balachandran Natarajan, Craig Rodrigues, Joseph P. Loyall, and Richard E. Schantz, "Total Quality of Service Provisioning in Middleware and Applications," Elsevier Journal of Microprocessors and Microsystems, Volume 26, Number 9-10, January 2003.
- J40 Christopher D. Gill, Douglas C. Schmidt, and Ron Cytron, "Multi-Paradigm Scheduling for Distributed Real-Time Embedded Computing," IEEE Proceedings Special Issue on Modeling and Design of Embedded Systems, Volume 91, Number 1, January, 2003.
- J39 Aniruddha Gokhale, Bala Natarajan, Douglas C. Schmidt, and Nanbor Wang, "Modeling and Synthesis of Middleware Components," Communications of the ACM, special issue on Enterprise Components, Services and Business Rules, edited by Ali Arsanjani, October 2002.
- J38 Douglas C. Schmidt and Carlos O'Ryan, "Patterns and Performance of Distributed Real-time and Embedded Publisher/Subscriber Architectures," the Journal of Systems and Software, Special Issue on Software Architecture – Engineering Quality Attributes, edited by Jan Bosch and Lars Lundberg, October 2002.
- J37 Douglas C. Schmidt, "R&D Advances in Middleware for Distributed, Real-time and Embedded Systems," Communications of the ACM, Volume 45, Number 6, June 2002, edited by Gul Agha.
- J36 Carlos O'Ryan, Douglas C. Schmidt, and J. Russell Noseworthy, "Patterns and Performance of a CORBA Event Service for Large-scale Distributed Interactive Simulations," International Journal of Computer Systems Science and Engineering, CRL Publishing, Volume 17, Number 2, March, 2002.
- J35 Douglas C. Schmidt, Bala Natarajan, Aniruddha Gokhale, Nanbor Wang, and Chris Gill, "TAO: A Pattern-Oriented Object Request Broker for Distributed Real-time and Embedded Systems," IEEE Distributed Systems Online, Volume 3, Number 2, February, 2002.
- J34 Douglas C. Schmidt, Rick Schantz, Mike Masters, Joseph Cross, David Sharp, and Lou Di-Palma, "Towards Adaptive and Reflective Middleware for Network-Centric Combat Systems," Cross-Talk, November, 2001.
- J33 Nanbor Wang, Douglas C. Schmidt, Ossama Othman, and Kirthika Parameswaran, "Evaluating Meta-Programming Mechanisms for ORB Middleware," *IEEE Communications Magazine* special issue on "Evolving Communications Software: Techniques and Technologies," co-edited by Bill Opdyke and Algirdas Pakstas, Volume 39, Number 10, October, 2001.
- J32 Nanbor Wang, Douglas C. Schmidt, Kirthika Parameswaran, and Michael Kircher, "Towards a Reflective Middleware Framework for QoS-enabled CORBA Component Model Applications," *IEEE Distributed Systems Online* special issue on Reflective Middleware, July, 2001.
- J31 Chris Gill, David Levine, and Douglas C. Schmidt, "The Design and Performance of a Real-Time CORBA Scheduling Service," *The Real-time Systems, The International Journal of Time-Critical Computing Systems*, special issue on Real-Time Middleware, Kluwer Academic Publishers, guest editor Wei Zhao, Volume 20, Number 2, March 2001.

- J30 Douglas C. Schmidt, Sumedh Mungee, Sergio Flores-Gaitan, and Aniruddha Gokhale, "Software Architectures for Reducing Priority Inversion and Non-determinism in Real-time Object Request Brokers," *Journal of Real-time Systems*, Kluwer, Vol. 21, No. 2, 2001.
- J29 Ossama Othman, Carlos O'Ryan, and Douglas C. Schmidt, "An Efficient Adaptive Load Balancing Service for CORBA," *IEEE Distributed Systems Online*, March, 2001.
- J28 Ossama Othman, Carlos O'Ryan, and Douglas C. Schmidt "The Design of an Adaptive CORBA Load Balancing Service," *IEEE Distributed Systems Online*, April, 2001.
- J27 Carlos O'Ryan, Douglas C. Schmidt, Fred Kuhns, Marina Spivak, Jeff Parsons Irfan Pyarali, and David L. Levine, "Evaluating Policies and Mechanisms to Support Distributed Real-Time Applications with CORBA," *Concurrency and Computation: Practice and Experience* (Special Issue on Distributed Objects and Applications), Wiley and Sons, Vol. 13, No. 2, February, 2001.
- J26 Douglas C. Schmidt, Vishal Kachroo, Yamuna Krisnamurthy, and Fred Kuhns, "Developing Next-generation Distributed Applications with QoS-enabled DPE Middleware," *IEEE Communications magazine*, edited by Abdi Modarressi and Sheshadri Mohan, Vol 17, No. 10, October, 2000.
- J25 Douglas C. Schmidt and Fred Kuhns, "An Overview of the Real-time CORBA Specification," *IEEE Computer*, Special Issue on Object-Oriented Real-time Distributed Computing, edited by Eltefaat Shokri and Philip Sheu, June 2000.
- J24 James Hu and Douglas C. Schmidt, Developing Flexible and High-performance Web Servers with Frameworks and Patterns, Symposium on Frameworks, *ACM Computing Surveys*, (Fayad and Wegner, eds.) Vol. 32(1es), March 2000.
- J23 Fred Kuhns, Douglas C. Schmidt, Carlos O'Ryan, and David L. Levine, "Supporting High-performance I/O in QoS-enabled ORB Middleware," *Cluster Computing: the Journal on Networks, Software, and Applications*, Volume 3, Number 3, 2000.
- J22 Irfan Pyarali, Carlos O'Ryan, Douglas C. Schmidt, Nanbor Wang, Vishal Kachroo, and Aniruddha Gokhale, "Using Principle Patterns to Optimize Real-time ORBs," *IEEE Concurrency*, Object-Oriented Systems track, edited by Murthy Devarakonda, Volume 8, Number 1, January-March 2000.
- J21 James Hu, Irfan Pyarali, and Douglas C. Schmidt, "The Object-Oriented Design and Performance of JAWS: A High-performance Web Server Optimized for High-speed Networks," *The Parallel and Distributed Computing Practices* journal, special issue on Distributed Object-Oriented Systems, edited by Maria Cobb, Vol. 3, No. 1, March 2000.
- J20 Andy Gokhale and Douglas C. Schmidt, "Optimizing a CORBA IIOP Protocol Engine for Minimal Footprint Multimedia Systems," *IEEE Journal on Selected Areas in Communications* special issue on Service Enabling Platforms for Networked Multimedia Systems, September, 1999.
- J19 Douglas C. Schmidt and Chris Cleeland, "Applying Patterns to Develop Extensible and Maintainable ORB Middleware," *IEEE Communications Magazine*, April, 1999.
- J18 Irfan Pyarali and Douglas C. Schmidt, "An Overview of the CORBA Portable Object Adapter," Special Issue on CORBA in the *ACM StandardView* magazine, March, 1999.
- J17 Prashant Jain, Seth Widoff, and Douglas C. Schmidt, "The Design and Performance of Med-Java, A Distributed Electronic Medical Imaging System Developed with Java Applets and Web Tools," *IEEE/BCS Distributed Systems Engineering Journal*, Volume 5, No. 4, December 1998.
- J16 Douglas C. Schmidt, "Evaluating Architectures for Multi-threaded CORBA Object Request Brokers," *Communications of the ACM*, Special Issue on CORBA, ACM, edited by Krishnan Seetharaman, Volume 41, No. 10, October 1998.
- J15 Andy Gokhale and Douglas C. Schmidt, "Measuring and Optimizing CORBA Latency and Scalability Over High-speed Networks," *IEEE Transactions on Computing*, April, 1998.
- J14 Douglas C. Schmidt and James Hu, "Developing Flexible and High-performance Web Servers with Frameworks and Patterns," *Computing Surveys*, ACM, Vol. 29, March 1998.
- J13 Douglas C. Schmidt, David Levine, and Sumedh Mungee, "The Design of the TAO Real-Time Object Request Broker," *Computer Communications*, Special Issue on Building Quality of Service into Distributed System, Elsevier Science, April, 1998.
- J12 Guru Parulkar, Douglas C. Schmidt, Eileen Kraemer, Jon Turner, Anshul Kantawala, "An Ar-

- chitecture for Monitoring, Visualization, and Control and Gigabit Networks,” *IEEE Network*, September/October, 1997.
- J11 Douglas C. Schmidt, “Lessons Learned Building Reusable OO Frameworks for Distributed Software,” *Communications of the ACM Special Issue on OO Application Frameworks*, ACM, Vol. 40, No. 10, October, 1997.
- J10 Douglas C. Schmidt, “Applying Patterns to Meet the Challenges of Concurrent Software,” *IEEE Concurrency*, Special Edition on Software Engineering for Parallel and Distributed Systems, Vol. 5, No. 3, August, 1997.
- J9 Douglas C. Schmidt, Andy Gokhale, Tim Harrison, and Guru Parulkar, “A High-performance Endsystem Architecture for Real-time CORBA,” *IEEE Communications Magazine*, Vol. 14, No. 2, February, 1997.
- J8 Silvano Maffei and Douglas C. Schmidt, “Constructing Reliable Distributed Communication Systems with CORBA,” *IEEE Communications Magazine*, Vol. 14, No. 2, February, 1997.
- J7 Douglas C. Schmidt, “Using Design Patterns to Develop Reuseable Object-Oriented Software,” *ACM Computing Surveys*, Vol. 28, No. 4es, December 1996.
- J6 Irfan Pyarali, Douglas C. Schmidt, and Tim Harrison, “Design and Performance of an Object-Oriented Framework for High-Speed Electronic Medical Imaging,” *USENIX Computing Systems*, November/December, Vol. 9, No. 4, 1996.
- J5 Douglas C. Schmidt, “A Family of Design Patterns for Application-level Gateways,” *The Journal of Theory and Practice of Object Systems* (Special Issue on Patterns and Pattern Languages), Wiley and Sons, Vol. 2, No. 1, 1996.
- J4 Douglas C. Schmidt, “Experience Using Design Patterns to Develop Reuseable Object-Oriented Communication Software,” *Communications of the ACM Special Issue on Object-Oriented Experiences*, ACM, Vol. 38, No. 10, October, 1995, pp 65-74.
- J3 Douglas C. Schmidt and Tatsuya Suda, “An Object-Oriented Framework for Dynamically Configuring Extensible Distributed Systems,” *Distributed Systems Engineering Journal* (Special issue on Configurable Distributed Systems), IEE, Vol. 2, December, 1994, pp. 280-293.
- J2 Douglas C. Schmidt, Donald F. Box, and Tatsuya Suda, “ADAPTIVE: A Dynamically Assembled Protocol Transformation, Integration, and eValuation Environment,” *Journal of Concurrency: Practice and Experience*, Wiley and Sons, Ltd., Vol. 5, No. 4, June, 1993, pp. 269-286.
- J1 Douglas C. Schmidt and Tatsuya Suda, “Transport System Architecture Services for High- Performance Communication Systems,” *Journal of Selected Areas of Communications special issue on Protocols for Gigabit Networks*, IEEE, Vol. 11, No. 4, May, 1993, pp. 489-506.

## • Book Publications and Book Chapters

### – Books Authored

- BA5 Frank Buschmann, Kevlin Henney, and Douglas C. Schmidt, *Pattern-Oriented Software Architecture: On Patterns and Pattern Languages*, Wiley and Sons, 2007.
- BA4 Frank Buschmann, Kevlin Henney, and Douglas C. Schmidt, *Pattern-Oriented Software Architecture: A Pattern Language for Distributed Computing*, Wiley and Sons, 2007.
- BA3 Steve Huston and Douglas C. Schmidt, *C++ Network Programming: Systematic Reuse with ACE and Frameworks*, Addison-Wesley Longman, 2003.
- BA2 Douglas C. Schmidt and Steve Huston, *C++ Network Programming: Mastering Complexity with ACE and Patterns*, Addison-Wesley Longman, 2002.
- BA1 Douglas C. Schmidt, Michael Stal, Hans Rohert, and Frank Buschmann, *Pattern-Oriented Software Architecture: Patterns for Concurrent and Networked Objects*, John Wiley and Sons, 2000.

### – Book-length Reports Authored

- BR5 Anita Carleton, Mark H. Klein, John E. Robert, Erin Harper, Robert K Cunningham, Dionisio de Niz, John T. Foreman, John B. Goodenough, James D. Herbsleb, Ipek Ozkaya, Douglas C. Schmidt, Forrest Shull, “Architecting the Future of Software Engineering: A National Agen-

da for Software Engineering Research & Development,” CMU/SEI Press, November 2021.

- BR4 Werner Dahm, Douglas Schmidt, et al. “Cyber Situational Awareness,” SAB-TR-12-01, 1 October 2012.
- BR3 Alan Eckbreth, Charles Saff, Kevin Connolly, Natalie Crawford, Chris Eick, Mark Goorsky, Neil Kacena, David Miller, Robert Schafrik, Douglas Schmidt, “Sustaining Air Force Ag- ing Aircraft into the 21st Century,” SAB-TR-11-01 1 August 2011.
- BR2 William Scherlis, Robert Behler, Barry Boehm, Lori Clarke, Michael Cusumano, Mary Ann Davidson, Larry Druffel, Russell Frew, James Larus, Greg Morrisett, Walker Royce, Douglas C. Schmidt, John Stenbit, Kevin Sullivan, *Critical Code Software Producibility for Defense*, Committee for Advancing Software-Intensive Systems Producibility, National Research Council of the National Academies, Washington, D.C.
- BR1 Linda Northrop, Peter Feiler, Richard P. Gabriel, John Goodenough, Rick Linger, Tom Longstaff, Rick Kazman, Mark Klein, Linda Northrop, Douglas Schmidt, Kevin Sullivan, and Kurt Wallnau *Ultra-Large-Scale Systems: Software Challenge of the Future*, Software Engineering Institute, June 2006.

#### – Books Edited

- BE3 Co-editor of *Building Application Frameworks: Object-Oriented Foundations of Framework Design*, John Wiley & Sons, 1999 (co-editors are Mohamed Fayad and Ralph Johnson), ISBN 0-471-24875-4
- BE2 Co-editor of *Implementing Application Frameworks: Object-Oriented Frameworks at Work*, John Wiley & Sons, 1999 (co-editors are Mohamed Fayad and Ralph Johnson), ISBN 0-471-25201-8
- BE1 Co-editor of *Pattern Languages of Program Design*, Addison-Wesley, 1995 (co-editor is Jim Coplien, Bell Labs).

#### – Book Chapters

- BC70 Ashraf Elnashar, Max Moundas, Douglas C. Schmidt, Jesse Spencer-Smith, Jules White, “Advancing Generative AI in Software Development: Evaluating LLM-Generated Code Against Top Human Solutions,” the Communications in Computer and Information Science book series, Springer, 2025 (to appear).
- BC69 John Robert, Ipek Ozkaya, and Douglas C. Schmidt, “Detecting and Correcting Software Assurance Document Incompleteness, Inconsistencies, and Discrepancies using LLMs,” *Artificial Intelligence and Large Language Models: A Scientific Perspective*, edited by Helmut Degen, Abbas Moallem, and Stavroula Ntoa, CRC Press, 2025 (to appear).
- BC68 John Robert, Ipek Ozkaya, and Douglas C. Schmidt, “Transforming Software Engineering and Software Acquisition with Large Language Models,” *Artificial Intelligence and Large Language Models: A Scientific Perspective*, edited by Helmut Degen, Abbas Moallem, and Stavroula Ntoa, CRC Press, 2025 (to appear).
- BC67 Jules White, Sam Hays, Quchen Fu, Jesse Spencer-Smith, Douglas C. Schmidt, “Chat-GPT Prompt Patterns for Improving Code Quality, Refactoring, Requirements Elicitation, and Software Design,” *Generative AI for Effective Software Development* edited by Anh Nguyen Duc, Pekka Abrahamsson, and Foutse Khomh, Springer Nature, 2024.
- BC66 Evan Segaul, Douglas C. Schmidt, and Jesse Spencer-Smith, “Evaluation of Generic Deep Learning Building Blocks for Segmentation of 19th Century Documents,” *Deep Learning - Recent Findings and Research*, edited by Manuel Dominguez-Morales, Javier Civit-Masot, and Luis Munoz-Saavedra, IntechOpen, 2023.
- BC65 Douglas C. Schmidt, “Data Collection in the Age of Surveillance Capitalism,” *Collecting in the Twenty-First Century: From Museums to the Web*, edited by Johannes Endres and Christoph Zeller, Camden House, Rochester, New York, 2022.
- BC64 Michael Walker, Douglas C. Schmidt, and Abhishek Dubey, “Testing at Scale of IoT Blockchain Applications,” *Role of Blockchain Technology in IoT Applications*, Volume 115, 1st Edition, edited by Shiho Kim, Ganesh Chandra Deka, and Peng Zhang, 2019.
- BC63 Peng Zhang, Douglas C. Schmidt, Jules White, and Abhishek Dubey, “Consensus Mech-

- anisms and Information Security Technologies," *Role of Blockchain Technology in IoT Applications*," Volume 115, 1st Edition, edited by Shiho Kim, Ganesh Chandra Deka, and Peng Zhang, 2019.
- BC62 Peng Zhang, Douglas C. Schmidt, Jules White, and Gunther Lenz, "Blockchain Technology Use Cases in Healthcare," *Blockchain Technology: Platforms, Tools, and Use Cases*, edited by Ganesh Deka, 2018.
- BC61 Michael Walker, Douglas C. Schmidt, and Jules White, "An Elastic Platform for Large-scale Assessment of Software Assignments for MOOCs (EPLASAM)," *User-Centered Design Strategies for Massive Open Online Courses (MOOCs)*, edited by Ricardo Mendoza-Gonzalez, IGI Global, 2016.
- BC60 Joseph Hoffert, Douglas C. Schmidt, and Aniruddha Gokhale, "Quantitative Productivity Analysis of a Domain-Specific Modeling Language," in the *Handbook of Research on Innovations in Systems and Software Engineering*, IGI Global, Aug 2014, pp. 313-344.
- BC59 Will Otte, Douglas C. Schmidt, and Aniruddha Gokhale, "Performance and Scalability of a Large-scale Deployment and Configuration Framework," *The Performance of Open Source Applications*, edited by Tony Arkles and Tavish Armstrong, O'Reilly, 2013.
- BC58 Chris Thompson, Jules White, and Douglas C. Schmidt, "Analyzing Mobile Application Software Power Consumption via Model-Driven Engineering," *Advances and Applications in Model-Driven Software Engineering*, edited by Vicente Garcia Diaz, IGI Global, 2013.
- BC57 James Edmondson and Douglas C. Schmidt, "Towards Accurate Simulation of Large-Scale Systems via Time Dilation," *Real-time Simulation Technologies: Principles, Methodologies, and Applications*, edited by Katalin Popovici and Pieter J. Mosterman, CRC Press, 2012.
- BC56 James Hill and Douglas C. Schmidt, "Using Test Clouds to Enable Continuous Integration Testing of Distributed Real-time and Embedded System Applications," *Software Testing in the Cloud: Perspectives on an Emerging Discipline*. Edited by Scott Tilley and Tauhida Parveen, IGI Global, 2012.
- BC55 Angelo Corsaro and Douglas C. Schmidt, "The Data Distribution Service: The Communication Middleware Fabric for Scalable and Extensible Systems-of-Systems," *System of Systems*, edited by Adrian V. Gheorghe, InTech, 2012.
- BC54 Joe Hoffert and Douglas C. Schmidt, "Improving Software Development Productivity for QoS Policy Configurations," *Model-Driven Domain Analysis and Software Development: Architectures and Functions*, a book edited by Janis Osis and Erika Asnina, 2011.
- BC53 Nilabja Roy and Douglas C. Schmidt, "Model-Driven Performance Evaluation of Web Application Portals," *Model-Driven Domain Analysis and Software Development: Architectures and Functions*, a book edited by Janis Osis and Erika Asnina, 2011.
- BC52 Brian Dougherty, Jules White, and Douglas C. Schmidt, "MDA-based Configuration of Distributed Real-time and Embedded Systems," *Model-Driven Domain Analysis and Software Development: Architectures and Functions*, a book edited by Janis Osis and Erika Asnina, 2011.
- BC51 Hamilton Turner, Jules White, Brian Dougherty, and Douglas C. Schmidt, "Building Mobile Sensor Networks Using Smartphones and Web Services: Ramifications and Development Challenges," *Handbook of Research on Mobility and Computing: Evolving Technologies and Ubiquitous Impacts*, edited by Maria Manuela Cruz-Cunha and Fernando Moreira, IGI Global, Hershey, PA, USA 2009.
- BC50 Gan Deng, Jeff Gray, Douglas C. Schmidt, Yuehua Lin, Aniruddha Gokhale, and Gunther Lenz, "Evolution in Model-Driven Software Product-Line Architectures," *Software Applications: Concepts, Methodologies, Tools, and Applications*, edited by Pierre F. Tiako, 2009.
- BC49 Jules White, Douglas C. Schmidt, Andrey Nechypurenko, and Egon Wuchner, "Reducing the Complexity of Modeling Large Software Systems," *Software Applications: Concepts, Methodologies, Tools, and Applications*, edited by Pierre F. Tiako, 2009.
- BC48 Jules White, Brian Dougherty, Harrison Strowd, and Douglas C. Schmidt, "Using Fil-

- tered Cartesian Flattening and Microbooting to Build Enterprise Applications with Self-adaptive Healing," *Software Engineering for Self-Adaptive Systems*, edited by Betty H. C. Cheng, Rogerio de Lemos, Holger Giese, Paola Inverardi, and Jeff Magee, 2009. BC47
- Jeff Gray, Sandeep Neema, Jing Zhang, Yuehua Lin, Ted Bapty, Aniruddha Gokhale, and Douglas C. Schmidt, "Concern Separation for Adaptive QoS Modeling in Distributed Real-Time Embedded Systems," *Behavioral Modeling for Embedded Systems and Technologies: Applications for Design and Implementation*, edited by Joa M. Fernandes and Luis Gomes, 2009.
- BC46 Rick Schantz and Douglas C. Schmidt, "Middleware for Distributed Systems," Wiley *Encyclopedia of Computer Science and Engineering*, edited by Benjamin Wah, 2008.
- BC45 Jules White, Andrey Nechypurenko, Egon Wuchner, and Douglas C. Schmidt, "Reducing the Complexity of Optimizing Large-scale Systems by Integrating Constraint Solvers with Graphical Modeling Tools," *Designing Software-Intensive Systems: Methods and Principles*, Edited by Dr. Pierre F. Tiako, Langston University, OK, April 2008.
- BC44 Gan Deng, Douglas C. Schmidt, Aniruddha Gokhale, Jeff Gray, Yuehua Lin, and Gunther Lenz, "Evolution in Model-Driven Software Product-line Architecture," *Designing Software-Intensive Systems: Methods and Principles*, Edited by Dr. Pierre F. Tiako, Langston University, OK, April 2008.
- BC43 Daniel G. Waddington, Nilabja Roy, and Douglas C. Schmidt, "Dynamic Analysis and Profiling of Multi-threaded Systems," *Designing Software-Intensive Systems: Methods and Principles*, Edited by Dr. Pierre F. Tiako, Langston University, OK, April 2008.
- BC42 Krishnakumar Balasubramanian, Douglas C. Schmidt, Zoltan Molnar, and Akos Ledecz, "System Integration via Model-Driven Engineering," *Designing Software-Intensive Systems: Methods and Principles* Edited by Dr. Pierre F. Tiako, Langston University, OK, April 2008.
- BC41 James Hill, Douglas C. Schmidt, and John Slaby, "System Execution Modeling Tools for Evaluating the Quality of Service of Enterprise Distributed Real-time and Embedded System," *Designing Software-Intensive Systems: Methods and Principles*, Edited by Dr. Pierre F. Tiako, Langston University, OK, April 2008.
- BC40 Gan Deng, Chris Gill, Douglas C. Schmidt, and Nanbor Wang, "QoS-enabled Component Middleware for Distributed Real-Time and Embedded Systems," *Handbook of Real-Time and Embedded Systems* (I. Lee, J. Leung, and S. Son, eds.), CRC Press, 2007.
- BC39 William Otte and Douglas C. Schmidt, "Labor-Saving Architecture: an Object-Oriented Framework for Networked Software," *Beautiful Code*, edited by Greg Wilson, O'Reilly, 2007.
- BC38 Irfan Pyarali, Carlos O'Ryan, and Douglas C. Schmidt, "A Pattern Language for Efficient, Predictable, Scalable, and Flexible Dispatching Components," *Pattern Language of Program Design 5* book, Addison-Wesley, Reading, MA, 2006.
- BC37 Douglas C. Schmidt, Krishnakumar Balasubramanian, Arvind S. Krishna, Emre Turkay, and Aniruddha Gokhale, *Model-driven Development of Component-based Distributed Real-time and Embedded Systems, Model Driven Engineering for Distributed Real-time and Embedded Systems*, edited by Sebastien Gerard, Joel Champea, and Jean-Philippe Babau, Hermes, 2005.
- BC36 Gabriele A. Trombetti, Aniruddha Gokhale, Douglas C. Schmidt, John Hatcliff, Gurdip Singh, and Jesse Greenwald, "An Integrated Model-driven Development Environment for Composing and Validating Distributed Real-time and Embedded Systems," *Model-driven Software Development: Volume II of Research and Practice in Software Engineering*, edited by Sami Beydeda, Matthias Book, and Volker Gruhn, Springer-Verlag, 2005.
- BC35 Arvind S. Krishna, Douglas C. Schmidt, Ray Klefstad, and Angelo Corsaro, "Real-time CORBA Middleware," in *Middleware for Communications*, edited by Qusay Mahmoud, Wiley and Sons, New York, 2003.
- BC34 Nanbor Wang, Douglas C. Schmidt, Aniruddha Gokhale, Craig Rodrigues, Balachandran Natarajan, Joseph P. Loyall, Richard E. Schantz, and Christopher D. Gill, "QoS-enabled

- Middleware,” in *Middleware for Communications*, edited by Qusay Mahmoud, Wiley and Sons, New York, 2003.
- BC33 Aniruddha Gokhale, Douglas C. Schmidt, Balachandran Natarajan, Jeff Gray, and Nanbor Wang, “Model Driven Middleware,” in *Middleware for Communications*, edited by Qusay Mahmoud, Wiley and Sons, New York, 2003.
- BC32 Jeff Gray, Janos Sztipanovits, Ted Bapty, Sandeep Neema, Aniruddha Gokhale, and Douglas C. Schmidt, “Two-level Aspect Weaving to Support Evolution of Model-Based Software,” in *Aspect-Oriented Software Development*, edited by Robert Filman, Tzilla Elrad, Mehmet Aksit, and Siobhan Clarke, Reading, Massachusetts: Addison-Wesley, 2003.
- BC31 Joseph K. Cross and Douglas C. Schmidt “Applying the Quality Connector Pattern to Optimize Distributed Real-time and Embedded Middleware,” *Patterns and Skeletons for Parallel and Distributed Computing*, edited by Fethi Rabhi and Sergei Gorlatch, Springer Verlag, 2002.
- BC30 Richard E. Schantz and Douglas C. Schmidt, “Middleware for Distributed Systems: Evolving the Common Structure for Network-centric Applications,” *Encyclopedia of Software Engineering*, edited by John Marciniak and George Telecki, Wiley and Sons, 2001.
- BC29 Sumedh Mungee, Nagarajan Surendran, Yamuna Krishnamurthy, and Douglas C. Schmidt “The Design and Performance of a CORBA Audio/Video Streaming Service,” *Multimedia Networking: Technology, Management, and Applications*, edited by Mahbubur Syed, Idea Group Publishing, Hershey, USA, 2001.
- BC28 Nanbor Wang, Douglas C. Schmidt, and Carlos O’Ryan “An Overview of the CORBA Component Model,” *Component-Based Software Engineering*, (George Heineman and Bill Council, eds.), Addison-Wesley, Reading, MA, 2001.
- BC27 Douglas C. Schmidt, “Applying a Pattern Language to Develop Application-Level Gateways,” *Design Patterns in Communications*, (Linda Rising, ed.), Cambridge University Press, 2000.
- BC26 Douglas C. Schmidt and Chris Cleeland, “Applying a Pattern Language to Develop Extensible ORB Middleware,” *Design Patterns in Communications*, (Linda Rising, ed.), Cambridge University Press, 2000.
- BC25 Carlos O’Ryan, Fred Kuhns, Douglas C. Schmidt, and Jeff Parsons, “Applying Patterns to Develop a Pluggable Protocols Framework for Object Request Broker Middleware,” *Design Patterns in Communications*, (Linda Rising, ed.), Cambridge University Press, 2000.
- BC24 David L. Levine, Christopher D. Gill, and Douglas C. Schmidt, “Object Lifecycle Manager – A Complementary Pattern for Controlling Object Creation and Destruction,” *Design Patterns in Communications*, (Linda Rising, ed.), Cambridge University Press, 2000.
- BC23 Douglas C. Schmidt, “A Family of Design Patterns For Flexibly Configuring Network Services in Distributed Systems,” *Design Patterns in Communications*, (Linda Rising, ed.), Cambridge University Press, 2000.
- BC22 James Hu and Douglas C. Schmidt, “JAWS: A Framework for High-performance Web Servers,” *Object-Oriented Application Frameworks* book, John Wiley & Sons, October, 1999.
- BC21 Chris Cleeland and Douglas C. Schmidt, “External Polymorphism, An Object Structural Pattern for Transparently Extending C++ Concrete Data Types” in *C++ Gems II*, (Robert Martin, ed.), SIGS, NY, 1999.
- BC20 Douglas C. Schmidt, “GPERF: A Perfect Hash Function Generator” in *C++ Gems II*, (Robert Martin, ed.), SIGS, NY, 1999.
- BC19 Douglas C. Schmidt, Tim H. Harrison, and Nat Pryce, “Thread-specific Storage: an Object Behavioral Pattern for Efficiently Accessing per-Thread State” in *C++ Gems II*, (Robert Martin, ed.), SIGS, NY, 1999.
- BC18 Irfan Pyrali, Tim Harrison, Douglas C. Schmidt, and Thomas Jordan, “Proactor: an Object Behavioral Pattern for Demultiplexing and Dispatching Handlers for Asynchronous Events,” *Pattern Languages of Program Design*, (Harrison, Foote, and Rohnert, eds.), Addison-Wesley, Reading, MA, 1999.

- BC17 Douglas C. Schmidt and Paul Stephenson, "Using Design Patterns to Evolve System Software from UNIX to Windows NT," In *The Patterns Handbook*, (Linda Rising, ed.), Cambridge University Press, 1998.
- BC16 Douglas C. Schmidt, David L. Levine, and Chris Cleeland, "Architectures and Patterns for High-performance, Real-time CORBA Object Request Brokers," *Advances in Computers*, Academic Press, Ed., Marvin Zelkowitz, Volume 48, July 1999.
- BC15 Douglas C. Schmidt and Tatsuya Suda, "A Framework for Measuring the Performance of Alternative Process Architectures for Parallel Communication Subsystems," in *Network Performance Modeling and Simulation*, Walrand, Bagchi, and Zobrist, Ed., Gordon and Breach Publishers, 1998.
- BC14 Douglas C. Schmidt, "Applying Design Patterns and Frameworks to Develop Object-Oriented Communication Software," *The Handbook of Programming Languages*, Volume I, edited by Peter Salus, MacMillan Computer Publishing, 1997.
- BC13 Chris Cleeland, Douglas C. Schmidt, and Tim H. Harrison, "External Polymorphism – An Object Structural Pattern for Transparently Extending Concrete Data Types," *Pattern Languages of Program Design*, (Martin, Buschmann, and Riehl, eds.), Addison-Wesley, Reading, MA, 1997.
- BC12 Timothy H. Harrison, Douglas C. Schmidt, and Irfan Pyarali, "Asynchronous Completion Token – An Object Behavioral Pattern for Efficient Asynchronous Event Handling," *Pattern Languages of Program Design*, (Martin, Buschmann, and Riehl, eds.), Addison-Wesley, Reading, MA, 1997.
- BC11 Douglas C. Schmidt and Timothy H. Harrison, "Double-Checked Locking – A Optimization Pattern for Efficiently Initializing and Accessing Thread-safe Objects," *Pattern Languages of Program Design*, (Martin, Buschmann, and Riehl, eds.), Addison-Wesley, Reading, MA, 1997.
- BC10 Douglas C. Schmidt, "Acceptor and Connector – A Family of Object Creational Patterns for Initializing Communication Services," *Pattern Languages of Program Design*, (Martin, Buschmann, and Riehl, eds.), Addison-Wesley, Reading, MA, 1997.
- BC9 Douglas C. Schmidt and Paul Stephenson, "Using Design Patterns to Evolve System Software from UNIX to Windows NT," In *Wisdom of the Gurus*, (Charles Bowman, ed.), Cambridge University Press, 1996.
- BC8 Douglas C. Schmidt and Steve Vinoski, "Comparing Alternative Distributed Programming Techniques" in *Wisdom of the Gurus*, (Charles Bowman, ed.), Cambridge University Press, 1996.
- BC7 Douglas C. Schmidt, "A Case Study in C++ Design Evolution" in *C++ Gems*, (Stanley Lippman, ed.), SIGS, NY, 1996, pp. 99-120.
- BC6 Douglas C. Schmidt and Steve Vinoski, "Distributed Object Computing in C++" in *C++ Gems*, (Stanley Lippman, ed.), SIGS, NY, 1996, pp. 303-316.
- BC5 Douglas C. Schmidt and Steve Vinoski, "Comparing Alternative Distributed Programming Techniques" in *C++ Gems*, (Stanley Lippman, ed.), SIGS, NY, 1996, pp. 316-336.
- BC4 Douglas C. Schmidt and Steve Vinoski, "Comparing Alternative Server Programming Techniques" in *C++ Gems*, (Stanley Lippman, ed.), SIGS, NY, 1996, pp. 337-362.
- BC3 Douglas C. Schmidt and Charles D. Cranor, "Half-Sync/Half-Async: An Architectural Pattern for Efficient and Well-structured Concurrent I/O" in *Pattern Languages of Program Design*, (Coplien, Vlissides, and Kerth, eds.), Addison-Wesley, Reading, MA, 1996.
- BC2 R. Greg Lavender and Douglas C. Schmidt, "Active Object: An Object Behavioral Pattern for Concurrent Programming," in *Pattern Languages of Program Design*, (Coplien, Vlissides, and Kerth, eds.), Addison-Wesley, Reading, MA, 1996.
- BC1 Douglas C. Schmidt, "Reactor: An Object Behavioral Pattern for Concurrent Event Demultiplexing and Event Handler Dispatching," *Pattern Languages of Program Design*, (Addison-Wesley, 1995), edited by James O. Coplien and Douglas C. Schmidt.

• **Refereed Conference Publications**

- C217 Ashraf Elnashar, Douglas C. Schmidt, and Jules White, "Preference-Driven Refinement of Prompts: A Systematic Prompt Engineering Method for Helping to Automate Software Engineering, Proceedings of the 12th International Conference on Artificial Intelligence (ICOAI 2025), October 27-29, 2025, Paris, France.
- C216 John Robert, Carlos Olea, Yash Hindka, Nanette Brown, and Douglas C. Schmidt, "Accelerating Software Acquisition Using Generative AI for Regulatory Compliance," Proceedings of the 22<sup>nd</sup> Annual Acquisition Research Symposium & Innovation Summit, May 7-8, 2025, Monterey, CA.
- C215 Skyler Grandel, Douglas C. Schmidt, and Kevin Leach, "Applying Large Language Models to Enhance the Assessment of Java Programming Assignments," Proceedings of the ACM Foundations of Software Engineering Conference Software Engineering Education Track, June 2025, Trondheim, Norway.
- C214 William Schreiber, Jules White, and Douglas C. Schmidt, "Toward a Pattern Language for Persona-based Interactions with LLMs," Proceedings of the 31st Pattern Languages of Programming (PLoP) conference, Columbia River Gorge, Washington USA, October 13-16, 2024.
- C213 Max Moundas, Jules White, and Douglas C. Schmidt, "Prompt Patterns for Structured Data Extraction from Unstructured Text," Proceedings of the 31st Pattern Languages of Programming (PLoP) conference, Columbia River Gorge, Washington USA, October 13-16, 2024.
- C212 Ashraf Elnashar, Max Moundas, Douglas C. Schmidt, Jesse Spencer-Smith, Jules White, "Evaluating the Performance of LLM-Generated Code for ChatGPT-4 and AutoGen Along with Top-Rated Human Solutions," Proceedings of the International Conference on Software Technologies (ICSOFT) 2024, Dijon, France, pp. 258–270, INSTICC, SciTePress, July 2024.
- C211 Dionisio de Niz, Bjorn Andersson, Mark H. Klein, John Lehoczky, Hyoseung Kim, George Romanski, Jonathan Preston, Floyd Fazi, Daniel Shapiro, Douglas C. Schmidt, Ronald Koontz, and Sam Procter, "Flight Incident Analysis Through Symbolic Argumentation," 43rd Digital Avionics Systems Conference, San Diego, CA, October 2024.
- C210 Alfred Schenker, Nickolas H. Guertin, and Douglas C. Schmidt, "A Model for Evaluating the Maturity of a Modular Open Systems Approach," 21st Annual Acquisition Research Symposium, Naval Post Graduate School, Monterey, CA, May 8-9, 2024.
- C209 Carlos Olea, Holly Tucker, Jessica Phelan, Cameron Pattison, Shen Zhang, Maxwell Lieb, Doug Schmidt, Jules White, "Evaluating Persona Prompting for Question Answering Tasks," Proceedings of 10th International Conference on Artificial Intelligence and Soft Computing (AIS 2024), June 22-23, 2024, Sydney, Australia.
- C208 Henry Gilbert, Michael Sandborn, Douglas C. Schmidt, Jesse Spencer-Smith, and Jules White, Semantic Compression With Large Language Models, Proceedings of the International Symposium on Foundation and Large Language Models (FLLM 2023), 21-24 November, 2023, Abu Dhabi, UAE.
- C207 Jules White, Quchen Fu, Sam Hays, Michael Sandborn, Carlos Olea, Henry Gilbert, Ashraf Elnashar, Jesse Spencer-Smith, Douglas C. Schmidt, "A Prompt Pattern Catalog to Enhance Prompt Engineering with ChatGPT," Proceedings of the 30th Pattern Languages of Programming (PLoP) conference, Allerton Park, IL, October 23-25th, 2023.
- C206 Ashraf Elnashar, Max Moundas, Douglas C. Schmidt, Jesse Spencer-Smith, Jules White, "Prompt Engineering of ChatGPT to Improve Generated Code and Runtime Performance Compared with the Top-Voted Human Solutions," Proceedings of the 2023 IEEE 22nd International Conference on Cognitive Informatics and Cognitive Computing, August 19-21st, 2023 Stanford, CA, USA.
- C205 Douglas C. Schmidt, Jesse Spencer-Smith, Quchen Fu, and Jules White, "Cataloging Prompt Patterns to Enhance the Discipline of Prompt Engineering," International Conference on Reliable Software Technologies (AEiC 2023) 13-16 June 2023, Lisbon, Portugal.
- C204 Ashraf Elnashar, William Schreiber, Jules White, and Douglas C. Schmidt, "Question Formulation and Transformer Model Resilience," Proceedings of the 2022 International Conference on Computational Science and Computational Intelligence (CSCI'22), December 14-16, 2022; Las Vegas, USA.
- C203 Henry Gilbert, Jules White, Douglas C. Schmidt, "Using LSTM Networks and Future Gradient Values to Forecast Heart Rate in Biking," Proceedings of the International Conference on Sports Sciences Research and Technology Support, Valletta, Malta, Oct. 27-28, 2022.

- C202 Zhongwei Teng, Quchen Fu, Jules White, Maria E. Powell, and Douglas C. Schmidt, "SA-SASV: An End-to-End Spoof-Aggregated Spoofing-Aware Speaker Verification System," Proceedings of the 23rd INTERSPEECH Conference from September 18 to 22, 2022, Incheon, Korea.
- C201 Zhongwei Teng, Quchen Fu, White Jules, Maria Powell, and Douglas Schmidt, "ARawNet: A Lightweight Solution for Leveraging Raw Waveforms in Spoof Speech Detection," Proceedings of the 26th International Conference on Pattern Recognition, August 21-25, 2022, Montreal, Canada.
- C200 Quchen Fu, Zhongwei Teng, Jules White, Maria E. Powell, and Douglas C. Schmidt, "Fastaudio: A Learnable Audio Front-end for Spoof Speech Detection," proceedings of the International Conference on Acoustics, Speech, and Signal Processing (ICASSP), May 22-27th, 2022, Singapore.
- C199 Quchen Fu, Zhongwei Teng, Jules White and Douglas Schmidt, "Translating Natural Language to Bash Code," proceedings of the IEEE 2021 International Conference on Machine Learning and Applications, December 13-16, 2021.
- C198 Zhongwei Teng, Quchen Fu, Jules White, and Douglas C. Schmidt, "Analyzing the Feasibility of Generating Data Visualizations from Hand-drawn Sketches Using Deep Learning," proceedings of the 20th IEEE International Conference on Machine Learning and Applications, December 13-16, 2021.
- C197 Xiaoxing Qiu, Jules White, Douglas C. Schmidt, "A Study of Machine Learning Models for Personalized Heart Rate Forecasting in Mountain Biking," 9th International Conference on Sport Sciences Research and Technology Support, October 28-29, 2021, Valletta, Malta.
- C196 Gabriela Gresenz, Jules White, and Douglas C. Schmidt, "An Off-Road Terrain Dataset Including Images Labeled With Measures of Terrain Roughness," proceedings of the IEEE International Conference on Autonomous Systems (IEEE ICAS 2021), Montreal, Canada, August 11-13, 2021.
- C195 Peng Zhang, Douglas C. Schmidt, and Jules White, "A Pattern Sequence for Designing Blockchain-Based Healthcare Information Technology Systems," the 26th Pattern Languages of Programming conference, October 7-10, 2019, Ottawa, Ontario, Canada.
- C194 Nick Guertin, Douglas C. Schmidt, and Harry Levinson, "All Capability to All Boats, All the Time: Adding Options to the TI/APB Process," Proceedings of the 2018 Joint Undersea Warfare Technology Fall Conference, Groton, CT, September 18th, 2018.
- C193 Zhongwei Teng, Peng Zhang, Xiao Li, William Nock, Marcelino Rodriguez-Cancio, Denis Gilmore, Jules White, Douglas C. Schmidt, and Jonathan C. Nesbitt, "Authentication and Usability in mHealth Apps," proceedings of the 2018 IEEE International Conference on E-health Networking, Application and Services (Healthcom), 17-20 September 2018, Ostrava, Czech Republic (winner of the "Outstanding Paper" award).
- C192 Peng Zhang, Douglas C. Schmidt, Jules White, and Shelagh A. Mulvaney, Towards Precision Behavioral Medicine with IoT: Iterative Design and Optimization of a Self-Management Tool for Type 1 Diabetes," proceedings of the 2018 IEEE International Conference on Healthcare Informatics (ICHI 2018), New York, NY, USA, June 4-7, 2018.
- C191 Nick Guertin, Douglas C. Schmidt, and Bill Scherlis, "Capability Composition and Data Interoperability to Achieve More Effective Results than DoD System-of-Systems Strategies," proceedings of 15th Annual Acquisition Research Symposium, May 9-10, 2018 in Monterey, CA.
- C190 Peng Zhang, Douglas C. Schmidt, Jules White, and Gunther Lenz, "Metrics for Assessing Blockchain-based Healthcare Decentralized Apps," Proceedings of the IEEE Healthcom 2017, October 12-15, 2017, Dalian, China.
- C189 Peng Zhang, Jules White, Douglas C. Schmidt, and Gunther Lenz, "Design of Blockchain-Based Apps Using Familiar Software Patterns to Address Interoperability Challenges in Healthcare," the 24th Pattern Languages of Programming (PLoP) conference, October 22-25, 2017, Vancouver, Canada.
- C188 Aron Laszka, Michael Walker, Abhishek Dubey and Douglas Schmidt, "Providing Privacy, Safety, and Security in IoT-Based Transactive Energy Systems using Distributed Ledgers," The 7th International Conference on the Internet of Things (IoT 2017), October 22-25, 2017, Linz, Austria.

- C187 Fangzhou Sun, Peng Zhang, Jules White, Douglas C. Schmidt, Jacob Staples, and Lee Krause, A Feasibility Study of Autonomously Detecting In-process Cyber-Attacks, Proceedings of the 3rd IEEE International Conference on Cybernetics (CYBCONF-2017), Special Session on Cyber Security.
- C186 Peng Zhang, Jules White, Douglas C. Schmidt, and Tom Dennis, "Discussions of a Preliminary Hand Hygiene Compliance Monitoring Application-as-a-Service", 10th International Conference on Health Informatics - HEALTHINF 2017, 21 - 23 February, 2017, Porto, Portugal.
- C185 Peng Zhang, Jules White, Douglas C. Schmidt, and Tom Dennis, "Applying Machine Learning Methods to Predict Hand Hygiene Compliance Characteristics," Proceedings of the Biomedical and Health Informatics Conference, Orlando, Florida, February 16-19, 2017.
- C184 Subhav Pradhan, Shweta Khare, Fangzhou Sun, Abhishek Dubey, Janos Sallai, Aniruddha Gokhale, Douglas Schmidt, Martin Lehofer, and Monika Sturm, "Towards a Distributed and Resilient Platform for Smart City Systems," First IEEE/ACM Symposium on Edge Computing, October 27-28, 2016, Washington DC.
- C183 Peng Zhang, Jules White, and Douglas C. Schmidt, "HoliCoW: Automatically Breaking Team-based Software Projects to Motivate Student Testing," Proceedings to the Software Engineering Education and Training track at the 38th International Conference on Software Engineering Austin, TX, May 14 - 22, 2016.
- C182 Nickolas H. Guertin, Robert Sweeney, and Douglas C. Schmidt, "How the Navy Can Use Open Systems Architecture to Revolutionize Capability Acquisition," Naval Postgraduate School's Acquisition Research Symposium, May 13th 2015, Monterey, CA.
- C181 Nickolas H. Guertin, Robert Sweeney, and Douglas C. Schmidt, "Benefits of Applying an Open Systems Architecture Approach," 17th Systems Engineering Conference, National Defense Industry Association, October 27-30, 2014, Washington DC.
- C180 Kyoungcho An, Aniruddha Gokhale, Sumant Tambe, Gerardo Pardo-Castellote, and Douglas C. Schmidt, "Content-based Filtering Discovery Protocol (CFDP): Scalable and Efficient OMG DDS Discovery Protocol," 8th ACM International Conference on Distributed Event-Based Systems, Mumbai, India, May 26-29, 2014.
- C179 Balakrishnan Dasarathy, Kevin Sullivan, Douglas C. Schmidt, Douglas H. Fisher, and Adam Porter, "The Past, Present, and Future of MOOCs and Their Relevance to Software Engineering," 36th ACM/IEEE International Conference on Software Engineering, Hyderabad, India, May 31 - June 7th, 2014.
- C178 Rick Leathart, Adam Porter, Douglas Schmidt, Michael O'Hare, Harry Crisp, and Barry Laird, "Capability-Based Technical Reference Frameworks for Open System Architecture Implementations," Systems Engineering Conference (SEDC) 20134, Washington DC, April 3rd and 4th, 2014, Chantilly, VA.
- C177 Douglas C. Schmidt, Chris Gill, and Jules White, "Elastic Infrastructure to Support Computing Clouds for Large-scale Cyber-Physical Systems," Proceedings of the International Symposium on Object-Oriented Real-time Distributed Computing (ISORC), June 2014, Reno, Nevada.
- C176 Douglas C. Schmidt and Zach McCormick, "Creating and Teaching a MOOC on Pattern-Oriented Software Architecture for Concurrent and Networked Software," Proceedings of the Wave-Front Forum at the SPLASH 2013 conference, October 2013, Indianapolis, IN.
- C175 Zach McCormick and Douglas C. Schmidt, "Data Synchronization Patterns in Mobile Application Design," Proceedings of the Pattern Languages of Programs (PLoP) 2012 conference, October 19-21, 2012, Tucson, Arizona.
- C174 James Edmondson, Aniruddha Gokhale and Douglas Schmidt, "Approximation Techniques for Maintaining Real-time Deployments Informed by User-provided Dataflows Within a Cloud," 31st International Symposium on Reliable Distributed Systems (SRDS 2012), 8th-11th October 2012, Irvine, California.
- C173 James Edmondson, Douglas C. Schmidt, and Aniruddha Gokhale "QoS-enabled Distributed Mutual Exclusion in Public Clouds," Proceedings of the 1st International Symposium on Secure Virtual Infrastructures (DOA-SVI'11), October 17-19, 2011, Crete, Greece.

- C172 Brian Dougherty, Jules White, Russell Kegley, Jonathan Preston, Douglas C. Schmidt, and Aniruddha Gokhale, "Optimizing Integrated Application Performance with Cache-aware Meta-scheduling," Proceedings of the 1st International Symposium on Secure Virtual Infrastructures (DOA-SVI'11), October 17-19, 2011, Crete, Greece.
- C171 Akram Hakiri, Aniruddha Gokhale, Douglas C. Schmidt, Berthou Pascal, Joe Hoffert, and Gayraud Thierry, "A SIP-based Network QoS Provisioning Framework for Cloud-hosted DDS Applications," Proceedings of the 1st International Symposium on Secure Virtual Infrastructures (DOA-SVI'11), October 17-19, 2011, Crete, Greece.
- C170 James Hill and Douglas C. Schmidt, "Experiences with Service-Oriented Middleware for Dynamic Instrumentation of Enterprise Distributed Real-time and Embedded Systems," Proceedings of the 1st International Symposium on Secure Virtual Infrastructures (DOA-SVI'11), October 17-19, 2011, Crete, Greece.
- C169 Will Otte, Aniruddha Gokhale, Douglas C. Schmidt, and Johnny Willemsen, "Infrastructure for Component-based DDS Application Development," proceedings of the Tenth International Conference on Generative Programming and Component Engineering (GPCE'11), October 22-23, 2011 Portland, Oregon, USA.
- C168 Will Otte, Aniruddha Gokhale, and Douglas C. Schmidt, Techniques for Predictable Deployment Latencies in Large-scale Component-based Distributed Real-time and Embedded Systems, Proceedings of the 14th International ACM SIGSOFT Symposium on Component Based Software Engineering (CBSE-2011), June 21th - 23th, 2011, in Boulder, Colorado, USA.
- C167 Chris Thompson, Hamilton Turner, Jules White, and Douglas C. Schmidt, Analyzing Mobile Application Software Power Consumption via Model-Driven Engineering, Proceedings of the 1st International Conference on Pervasive and Embedded Computing and Communication Systems, Algarve, Portugal, March 5-7, 2011.
- C166 Joe Hoffert, Douglas C. Schmidt, Aniruddha Gokhale, "Adapting Distributed Real-time and Embedded Publish/Subscribe Middleware for Cloud-Computing Environments," Proceedings of the ACM/IFIP/USENIX 11th International Middleware Conference, Bangalore, India, November 30-Dec 3, 2010.
- C165 Joe Hoffert and Douglas Schmidt, "Evaluating Supervised Machine Learning for Adapting Enterprise DRE Systems," Proceedings of the International Symposium on Intelligence Information Processing and Trusted Computing (IPTC 2010), Huanggang City, China, October 28-29, 2010.
- C164 J. Benjamin Gotow, Krzysztof Zienkiewicz, Jules White, and Douglas C. Schmidt, "Addressing Challenges in Delivering Augmented Reality Applications to Smartphones," Proceedings of the Third International ICST Conference on MOBILE Wireless MiddleWARE, Operating Systems, and Applications (Mobilware 2010), June 30-July 2, 2010, Chicago, IL.
- C163 Chris Thompson, Jules White, Brian Dougherty, Adam Albright, and Douglas C. Schmidt, "Using Smartphones and Wireless Mobile Networks to Detect Car Accidents and Provide Situational Awareness to Emergency Responders," Proceedings of the Third International ICST Conference on MOBILE Wireless MiddleWARE, Operating Systems, and Applications (Mobilware 2010), June 30-July 2, 2010, Chicago, IL.
- C162 James H. Hill, Hunt Sutherland, Douglas C. Schmidt, Thomas Silveria, John M. Slaby, Paul Staudinger, and Nikita A. Visnevski, "OASIS: A Service-Oriented Architecture for Dynamic Instrumentation of Enterprise Distributed Real-time and Embedded Systems," Proceedings of the 13th International Symposium on Object/Component/Service-oriented Real-time Distributed Computing (ISORC '10), May 5-6, 2010, Carmona, Spain.
- C161 Joseph P. Loyall, Matthew Gillen, Aaron Paulos, Larry Bunch, Marco Carvalho, James Edmondson, Pooja Varshneya, Douglas C. Schmidt, Andrew Martignoni, "Dynamic Policy-driven Quality of Service in Service-Oriented Systems," Proceedings of the 13th International Symposium on Object/Component/Service-oriented Real-time Distributed Computing (ISORC '10), May 5-6, 2010, Carmona, Spain.
- C160 Jaiganesh Balasubramanian, Aniruddha Gokhale, Abhishek Dubey, Friedhelm Wolf, Chenyang Lu, Chris Gill, and Douglas C. Schmidt, "Middleware for Resource-Aware Deployment and Configuration of Fault-tolerant Real-time Systems," Proceedings of the 16th IEEE Real-Time and Embedded Technology and Applications Symposium Stockholm, Sweden, April 12 - 15,

2010.

- C159 John S. Kinnebrew, Daniel L. C. Mack, Gautam Biswas, Douglas C. Schmidt, "Coordination of Planning and Scheduling Techniques for a Distributed, Multi-level, Multi-agent System", Proceedings of the 2nd International Conference on Agents and Artificial Intelligence (ICAART), Valencia, Spain, January 22-24, 2010.
- C158 Nilabja Roy, Yuan Xue, Aniruddha Gokhale, Larry Dowdy and Douglas C. Schmidt, "A Component Assignment Framework for Improved Capacity and Assured Performance in Web Portals," Proceedings of the 11th International Symposium on Distributed Objects, Middleware, and Applications (DOA'09) Vilamoura, Algarve-Portugal, Nov 01 - 03, 2009.
- C157 Joe Hoffert, Douglas C. Schmidt, and Aniruddha Gokhale, "Evaluating Transport Protocols for Real-time Event Stream Processing Middleware and Applications," Proceedings of the 11th International Symposium on Distributed Objects, Middleware, and Applications (DOA'09) Vilamoura, Algarve-Portugal, Nov 01 - 03, 2009.
- C156 Joe Hoffert and Douglas C. Schmidt, "Maintaining QoS for Publish/Subscribe Middleware in Dynamic Environments," Fast Abstract, 3rd ACM International Conference on Distributed Event-Based Systems (DEBS 2009) July 6-9, 2009 - Nashville, TN, USA.
- C155 Nilabja Roy, Larry Dowdy, and Douglas C. Schmidt, "The Impact of Variability on Soft Real-Time System Scheduling," Proceedings of the 15th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA 2009), Beijing, China, August 24-26, 2009.
- C154 Friedhelm Wolf, Jaiganesh Balasubramanian, Aniruddha Gokhale, and Douglas C. Schmidt, "Component Replication based on Failover Units," Proceedings of the 15th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA 2009), Beijing, China, August 24-26, 2009.
- C153 Jules White, David Benavides, Brian Dougherty, Douglas C. Schmidt, "Automated Reasoning for Multi-step Software Product-line Configuration Problems," Proceedings of the 13th International Software Product Line Conference (SPLC 2009) August 24-28, 2009, San Francisco, CA.
- C152 Joseph Loyall, Marco Carvalho, Douglas Schmidt, Matthew Gillen, Andrew Martignoni III, Larry Bunch, James Edmondson, and David Corman, "QoS Enabled Dissemination of Managed Information Objects in a Publish-Subscribe-Query Information Broker," the SPIE Defense Transformation and Net-Centric Systems conference, April, 2009, Orlando, FL.
- C151 Brian Dougherty, Jules White, Jaiganesh Balasubramanian, Chris Thompson, and Douglas C. Schmidt, "Deployment Automation with BLITZ," Proceedings of the Emerging Results track at the 31st International Conference on Software Engineering, Vancouver, Canada, May 16-24, 2009.
- C150 Brian Dougherty, Jules White, Chris Thompson, and Douglas C. Schmidt, "Automating Hardware and Software Evolution Analysis," Proceedings of the 16th Annual IEEE International Conference and Workshop on the Engineering of Computer Based Systems (ECBS), April 13-16, 2009, San Francisco, CA USA.
- C149 James H. Hill, Hamilton A. Turner, James R. Edmondson, and Douglas C. Schmidt, "Unit Testing Non-functional Concerns of Component-based Distributed Systems," Proceedings of the 2nd International Conference on Software Testing, Verification, and Validation, April 1 - 4, 2009, Denver, Colorado.
- C148 John S. Kinnebrew, William R. Otte, Nishanth Shankaran, Gautam Biswas, and Douglas C. Schmidt, "Intelligent Resource Management and Dynamic Adaptation in a Distributed Real-time and Embedded Sensor Web System," Proceedings of the 12th International Symposium on Object/Component/Service-oriented Real-time Distributed Computing (ISORC '09), Tokyo, Japan, March 17-20, 2009.
- C147 Jaiganesh Balasubramanian, Sumant Tambe, Chenyang Lu, Aniruddha Gokhale, Christopher Gill, and Douglas C. Schmidt, "Adaptive Failover for Real-time Middleware with Passive Replication, Proceedings of the 15th Real-time and Embedded Applications Symposium (RTAS) 2009, San Francisco, CA, United States, April 13 - 16, 2009.
- C146 William R. Otte, John. S. Kinnebrew, Douglas C. Schmidt, and Gautam Biswas, "A Flexible In-

- rastructure for Distributed Deployment in Adaptive Sensor Webs,” Proceedings of the 2009 IEEE Aerospace Conference, Big Sky, Montana, March 2009.
- C145 Nanbor Wang, Douglas C. Schmidt, Angelo Corsaro, and Hans Van’T Hag, “Toward an Adaptive Data Distribution Service for Dynamic Large-Scale Network-Centric Operation and Warfare Systems,” Proceedings of the 2008 Military Communications Conference, November 17-19, 2008 in San Diego, CA.
- C144 Joe Hoffert, Douglas C. Schmidt, and Aniruddha Gokhale, “DQML: A Modeling Language for Configuring Publish/Subscribe Quality of Service Policies,” Proceedings of the Distributed Objects, Middleware, and Applications (DOA’08), Monterrey, Mexico, Nov 10 - 12, 2008.
- C143 Nilabja Roy, Akshay Dabholkar, Nathan Hamm, Larry Dowdy and Douglas Schmidt, “Modeling Software Contention using Colored Petri Nets,” Proceedings of the 16th Annual Meeting of the IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS), September 8-10 2008, Baltimore, MD.
- C142 Jules White, Douglas C. Schmidt, David Benavides, Pablo Trinidad, Antonio Ruiz-Cortez, “Automated Diagnosis of Product-line Configuration Errors in Feature Models,” Proceedings of the Software Product Lines Conference (SPLC), September, 2008, Limerick, Ireland.
- C141 Jules White and Douglas C. Schmidt, “Model-Driven Product-Line Architectures for Mobile Devices,” Proceedings of the 17th Annual Conference of the International Federation of Automatic Control, Seoul, Korea, July 6-11, 2008.
- C140 Jules White and Douglas C. Schmidt, “Automated Configuration of Component-based Distributed Real-time and Embedded Systems from Feature Models,” Proceedings of the 17th Annual Conference of the International Federation of Automatic Control, Seoul, Korea, July 6-11, 2008.
- C139 William R. Otte, John. S. Kinnebrew, Douglas C. Schmidt, Gautam Biswas, and Dipa Suri, “Application of Middleware and Agent Technologies to a Representative Sensor Network,” Proceedings of the 2008 Earth Science Technology Conference, June 24-26, 2008, University of Maryland.
- C138 Jai Balasubramanian, Aniruddha Gokhale, Douglas C. Schmidt, and Nanbor Wang, “Towards Middleware for Fault-tolerance in Distributed Real-time and Embedded Systems,” Proceedings of the 8th IFIP International Conference on Distributed Applications and Interoperable Systems (DAIS 2008), Oslo, Norway, June 4-6, 2008.
- C137 Serena Fritsch, Aline Senart, Douglas C. Schmidt, and Siobhan Clarke, “Time-bounded Adaptation for Automotive System Software,” Proceedings of the Experience Track on Automotive Systems at the 30th International Conference on Software Engineering, Leipzig, Germany, 10 - 18 May 2008.
- C136 Nilabja Roy, John S. Kinnebrew, Nishanth Shankaran, Gautam Biswas, and Douglas C. Schmidt, “Toward Effective Multi-capacity Resource Allocation in Distributed Real-time and Embedded Systems,” Proceedings of the 11th IEEE International Symposium on Object/Component/Service-oriented Real-time Distributed Computing, Orlando, Florida, May 5-7, 2008.
- C135 Gan Deng, Douglas C. Schmidt, and Aniruddha Gokhale, “CaDANCE: A Criticality-Aware Deployment And Configuration Engine,” Proceedings of the 11th IEEE International Symposium on Object/Component/Service-oriented Real-time Distributed Computing, Orlando, Florida, May 5-7, 2008.
- C134 Krishnakumar Balasubramanian and Douglas C. Schmidt, “Physical Assembly Mapper: A Model-driven Optimization Tool for QoS-enabled Component Middleware,” Proceedings of 14th IEEE Real-Time and Embedded Technology and Applications Symposium, St. Louis, MO, United States, April 22 - April 24, 2008.
- C133 Jaiganesh Balasubramanian, Sumant Tambe, Balakrishnan Dasarathy, Shrirang Gadgil, Frederick Porter, Aniruddha Gokhale, and Douglas C. Schmidt, “NetQoPE: A Model-driven Network QoS Provisioning Engine for Distributed Real-time and Embedded Systems,” Proceedings of 14th IEEE Real-Time and Embedded Technology and Applications Symposium, St. Louis, MO, United States, April 22 - April 24, 2008.
- C132 James Hill, Douglas C. Schmidt, John Slaby, and Adam Porter, “CiCUTS: Combining System Ex-

- ecution Modeling Tools with Continuous Integration Environments,” Proceedings of the 15th Annual IEEE International Conference and Workshops on the Engineering of Computer Based Systems (ECBS), March 31st - 4th April, 2008 Belfast, Northern Ireland.
- C131 Vinny Cahill, Aline Senart, Douglas C. Schmidt, Stefan Weber, Anthony Harrington, Barbara Hughes, and Kulpreet Singh, “The Managed Motorway: Real-time Vehicle Scheduling: A Research Agenda,” Proceedings of the ACM HotMobile 2008, Silverado Resort, Napa Valley, CA, USA February 25-26, 2008.
- C130 Jules White, Krzysztof Czarnecki, Douglas Schmidt, Gunther Lenz, Christoph Wienands, Egon Wuchner, Ludger Fiege, “Automated Model-based Configuration of Enterprise Java Applications,” The 11th IEEE International EDOC Conference (EDOC 2007), 15-19 October 2007, Annapolis, Maryland U.S.A.
- C129 Joe Hoffert, Douglas Schmidt, and Aniruddha Gokhale, “A QoS Policy Configuration Modeling Language for Publish/Subscribe Middleware Platforms,” Proceedings of International Conference on Distributed Event-Based Systems (DEBS), June 20-22nd, 2007, Toronto, Canada.
- C128 Shanshan Jiang, Yuan Xue, and Douglas Schmidt, “Minimum Disruption Service Composition and Recovery in Mobile Ad hoc Networks, Proceedings of the 4th Annual International Conference on Mobile and Ubiquitous Systems: Computing, Networking and Services (MOBIQUITOUS 2007), August 6-10, 2007 - Philadelphia, PA.
- C127 Jules White, Andrey Nechypurenko, Egon Wuchner, and Douglas C. Schmidt, “Optimizing and Automating Product-Line Variant Selection for Mobile Devices,” Proceedings of the 11th International Software Product Line Conference, Kyoto, Japan, Sept 10-14, 2007.
- C126 Nishanth Shankaran, Douglas C. Schmidt, Yingming Chen, Xenofon Koutsoukous, and Chenyang Lu, The Design and Performance of Configurable Component Middleware for End-to-End Adaptation of Distributed Real-time Embedded Systems, proceedings of the 10th IEEE International Symposium on Object/Component/Service-oriented Real-time Distributed Computing, May 7-9, 2007, Santorini Island, Greece.
- C125 Amogh Kavimandan, Krishnakumar Balasubramanian, Nishanth Shankaran, Aniruddha Gokhale, and Douglas C. Schmidt, QUICKER: A Model-driven QoS Mapping Tool, proceedings of the 10th IEEE International Symposium on Object/Component/Service-oriented Real-time Distributed Computing (ISORC), May 7-9, 2007, Santorini Island, Greece.
- C124 Krishnakumar Balasubramanian, Douglas C. Schmidt, Zoltan Molnar, and Akos Ledeczki, Component-based System Integration via (Meta)Model Composition, Proceedings of the 14th Annual IEEE International Conference and Workshop on the Engineering of Computer Based Systems (ECBS), March 26th-29th, 2007, Tucson, Arizona.
- C123 Joe Hoffert, Shanshan Jiang, and Douglas C. Schmidt, “A Taxonomy of Discovery Services and Gap Analysis for Ultra-Large Scale Systems,” Proceedings of the ACMSE 2007: 45th ACM Southeast Conference Winston-Salem, North Carolina, USA March 23-24, 2007.
- C122 Andrey Nechypurenko, Egon Wuchner, Jules White, and Douglas C. Schmidt, Application of Aspect-based Modeling and Weaving for Complexity Reduction in Development of Automotive Distributed Realtime Embedded System, Proceedings of the Sixth ACM International Conference on Aspect-Oriented Software Development, Vancouver, British Columbia, March 12-16, 2007.
- C121 Dipa Suri, Adam Howell, Douglas C. Schmidt, Gautam Biswas, John Kinnebrew, Will Otte, and Nishanth Shankaran, “A Multi-agent Architecture for Smart Sensing in the NASA Sensor Web,” Proceedings of the 2007 IEEE Aerospace Conference Big Sky, Montana, March 3-10, 2007.
- C120 John S. Kinnebrew, Ankit Gupta, Nishanth Shankaran, Gautam Biswas, and Douglas C. Schmidt, A Decision-Theoretic Planner with Dynamic Component Reconfiguration for Distributed Real-Time Applications, Proceedings of the The 8th International Symposium on Autonomous Decentralized Systems (ISADS 2007) Sedona, Arizona, Wednesday March 21 - Friday March 23, 2007.
- C119 Ming Xiong, Jeff Parsons, James Edmondson, and Douglas C. Schmidt, “Evaluating Technologies for Tactical Information Management in Net-Centric Systems, Proceedings of the Defense Transformation and Net-Centric Systems conference, April 9-13, 2007, Orlando, Florida.

- C118 Nilabja Roy, Nishanth Shankaran, and Douglas C. Schmidt "Target Manager: A Resource Provisioning Service for Enterprise Distributed Real-time and Embedded Systems," Proceedings of the International Symposium on Distributed Objects and Applications (DOA), Montpellier, France, Oct 29 - Nov 3, 2006.
- C117 James Hill, John Slaby, Steve Baker, and Douglas C. Schmidt, "Evaluating Enterprise Distributed Real-time and Embedded System Quality of Service with System Execution Modeling Tools," Proceedings of the 12th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications, Sydney, Australia, 16-18 August 2006.
- C116 Nishanth Shankaran, Xenofon Koutsoukos, Chenyang Lu, Douglas C. Schmidt, and Yuan Xue, "Hierarchical Control of Multiple Resources in Distributed Real-time and Embedded Systems," Proceedings of the 18th Euromicro Conference on Real-Time Systems (ECRTS 06), Dresden, Germany, July 5-7, 2006.
- C115 Dipa Suri, Adam Howell, Nishanth Shankaran, John Kinnebrew, Will Otte, Doug Schmidt, and Gautam Biswas, "Onboard Processing using the Adaptive Network Architecture", Proceedings of the Sixth annual NASA Earth Science Technology Conference MD, June 27th - 29th, 2006, College Park, MD.
- C114 Gan Deng, Douglas C. Schmidt, Aniruddha Gokhale, and Andrey Nechypurenko, "Modularizing Variability and Scalability Concerns in Distributed Real-time and Embedded Systems with Modeling Tools and Component Middleware, Proceedings of the 9th IEEE International Symposium on Object-oriented Real-time Distributed Computing (ISORC '06), April 24-26, 2006, Gyeongju, Korea.
- C113 Stoyan Paunov and Douglas C. Schmidt, "RepoMan: A Component Repository Manager for Enterprise Distributed Real-time and Embedded Systems", Proceedings of the 44th ACM South-east Conference, Melbourne, FL, March 10-12, 2006.
- C112 Arvind S. Krishna, Aniruddha Gokhale, Douglas C. Schmidt, John Hatcliff, and Venkatesh Prasad Ranganat, "Context-Specific Middleware Specialization Techniques for Optimizing Software Product-line Architectures," Proceedings of ACM EuroSys 2006, Leuven, Belgium, April 18-21, 2006.
- C111 Stoyan Paunov, James Hill, Douglas C. Schmidt, John Slaby, and Steve Baker, "Domain-Specific Modeling Languages for Configuring and Evaluating Enterprise DRE System Quality of Service," Proceedings of the 13th Annual IEEE International Conference and Workshop on the Engineering of Computer Based Systems (ECBS '06), March 27th-30th, 2006, University of Potsdam, Potsdam, Germany.
- C110 Arvind S. Krishna, Aniruddha Gokhale, Douglas C. Schmidt, John Hatcliff, and Venkatesh Prasad Ranganat, "Towards Highly Optimized Real-time Middleware for Software Product-line Architectures," Proceedings of the Work-In-Progress session at the 26th IEEE Real-Time Systems Symposium, December 5-8, 2005, Miami, Florida.
- C109 Gan Deng, Jaiganesh Balasubramanian, William Otte, Douglas C. Schmidt, and Aniruddha Gokhale, DANCE: A QoS-enabled Component Deployment and Configuration Engine, Proceedings of the 3rd Working Conference on Component Deployment, Grenoble, France, November 28-29, 2005, p. 67-82.
- C108 Jaiganesh Balasubramanian, Balachandran Natarajan, Douglas C. Schmidt, Aniruddha Gokhale, Gan Deng, and Jeff Parsons, "Evaluating Techniques for Dynamic Component Updating," Proceedings of the International Symposium on Distributed Objects and Applications (DOA), Agia Napa, Cyprus, Oct 31 - Nov 4, 2005, p. 978-996.
- C107 Jules White, Douglas Schmidt, and Aniruddha Gokhale, "Simplifying Autonomic Enterprise Java Bean Applications via Model-driven Development: a Case Study," Proceedings of MOD-ELS 2005, ACM/IEEE 8th International Conference on Model Driven Engineering Languages and Systems, Half Moon Resort, Montego Bay, Jamaica, October 5-7, 2005, p. 601-615.
- C106 Arvind Krishna, Douglas C. Schmidt, and Michael Stal, "Context Object A Design Pattern for Efficient Middleware Request Processing," Proceedings of the 12th Pattern Language of Programming Conference, Allerton Park, Illinois, September 7-10, 2005.
- C105 Michael Stal and Douglas C. Schmidt, "Activator," Proceedings of the 12th Pattern Language of Programming Conference, Allerton Park, Illinois, September 7-10, 2005.

- C104 Jules White, Boris Kolpackov, Balachandran Natarajan, and Douglas C. Schmidt, "Reducing Code Complexity With Vocabulary-Specific XML Language Bindings," Proceedings of the 43<sup>rd</sup> ACM Southeastern conference in Atlanta, GA, March 2005.
- C103 Cemal Yilmaz, Arvind Krishna, Atif Memon, Adam Porter, Douglas C. Schmidt, Aniruddha Gokhale, and Bala Natarajan, "A Distributed Continuous Quality Assurance Process for Monitoring Performance Degradation in Evolving Software Systems, proceedings of the 27th International Conference on Software Engineering, St. Louis, MO, May 15-21, 2005, p. 293- 302.
- C102 Arvind S. Krishna, Emre Turkey, Aniruddha Gokhale, and Douglas C. Schmidt, Model-Driven Techniques for Evaluating the QoS of Middleware Configurations for DRE Systems, Proceedings of the 11th IEEE Real-Time and Embedded Technology and Applications Symposium, San Francisco, CA, March 2005, p. 180-189.
- C101 Krishnakumar Balasubramanian, Jaiganesh Balasubramanian, Jeff Parsons, Aniruddha Gokhale, and Douglas C. Schmidt, "A Platform-Independent Component Modeling Language for Distributed Real-time and Embedded Systems," Proceedings of the 11th IEEE Real-Time and Embedded Technology and Applications Symposium, San Francisco, CA, March 2005, p. 190-199.
- C100 Nanbor Wang, Christopher Gill, Douglas C. Schmidt, and Venkita Subramonian, "Configuring Real-time Aspects in Component Middleware," Proceedings of the Conference on Distributed Objects and Applications (DOA 2004), October 25-29, 2004, Cyprus, Greece.
- C99 Jaiganesh Balasubramanian, Douglas C. Schmidt, Lawrence Dowdy, and Ossama Othman, "Evaluating the Performance of Middleware Load Balancing Strategies," Proceedings of the 8th International IEEE Enterprise Distributed Object Computing Conference, Monterey, California, September 20-24, 2004.
- C98 George Edwards, Gan Deng, Douglas C. Schmidt, Aniruddha Gokhale, and Balachandran Natarajan, "Model-driven Configuration and Deployment of Component Middleware Publisher/Subscriber Services," Proceedings of the 3rd ACM International Conference on Generative Programming and Component Engineering, Vancouver, CA, October 2004.
- C97 Andrey Nechypurenko, Douglas C. Schmidt, Tao Lu, Gan Deng, Emre Turkey, and Aniruddha Gokhale, "Concern-based Composition and Reuse of Distributed Systems," Proceedings of the 8th International Conference on Software Reuse, ACM/IEEE, Madrid, Spain, July 2004.
- C96 Arvind Krishna, Douglas C. Schmidt, Adam Porter, Atif Memon, Diego Sevilla-Ruiz, "Improving the Quality of Performance-intensive Software via Model-integrated Distributed Continuous Quality Assurance," Proceedings of the 8th International Conference on Software Reuse, ACM/IEEE, Madrid, Spain, July 2004.
- C95 Chris Gill, Jeanna M. Gossett, David Corman, Joseph P. Loyall, Richard E. Schantz, Michael Atighetchi, and Douglas C. Schmidt, "Integrated Adaptive QoS Management in Middleware: An Empirical Case Study," Proceedings of the 10th Real-time Technology and Application Symposium, May 25-28, 2004, Toronto, CA.
- C94 Pradeep Gore, Douglas C. Schmidt, Chris Gill, and Irfan Pyarali, "The Design and Performance of a Real-time Notification Service," Proceedings of the 10th IEEE Real-time Technology and Application Symposium (RTAS '04), Toronto, CA, May 2004.
- C93 Yamuna Krishnamurthy, Chris Gill, Douglas C. Schmidt, Irfan Pyarali, Louis Mgeta, Yuanfang Zhang, and Stephen Torri, "The Design and Performance of Real-time CORBA 2.0: Dynamic Scheduling in TAO," Proceedings of the 10th IEEE Real-time Technology and Application Symposium (RTAS '04), Toronto, CA, May 2004.
- C92 Arvind S. Krishna, Nanbor Wang, Balachandran Natarajan, Aniruddha Gokhale, Douglas C. Schmidt and Gautam Thaker, "CCMPPerf: A Benchmarking Tool for CORBA Component Model Implementations," Proceedings of the 10th IEEE Real-time Technology and Application Symposium (RTAS '04), Toronto, CA, May 2004.
- C91 George Edwards, Douglas C. Schmidt, Aniruddha Gokhale, and Bala Natarajan, Integrating Publisher/Subscriber Services in Component Middleware for Distributed Real-time and Embedded Systems, Proceedings of the 42nd ACM Southeastern conference in Huntsville, AL, April 2004.

- C90 Atif Memon, Adam Porter, Cemal Yilmaz, Adithya Nagarajan, Douglas C. Schmidt, and Bala Natarajan, "Skoll: Distributed Continuous Quality Assurance," Proceedings of the 26<sup>th</sup> IEEE/ACM International Conference on Software Engineering, Edinburgh, Scotland, May 2004.
- C89 Arvind Krishna, Douglas C. Schmidt, and Raymond Klefstad, "Enhancing Real-Time CORBA via Real-Time Java," Proceedings of the 24th IEEE International Conference on Distributed Computing Systems (ICDCS), March 23-26, 2004, Tokyo, Japan.
- C88 Arvind Krishna, Douglas C. Schmidt, Krishna Raman, and Raymond Klefstad, "Enhancing Real-time CORBA Predictability and Performance," Proceedings of the 5th International Symposium on Distributed Objects and Applications (DOA), Catania, Sicily, November 2003.
- C87 Jeff Gray, Ted Bapty, Sandeep Neema, Douglas C. Schmidt, Aniruddha Gokhale, and Balachandran Natarajan, "An Approach for Supporting Aspect-Oriented Domain Modeling, Proceedings of the 2nd Generative Programming and Component Engineering (GPCE '03) conference, Erfurt, Germany, September 22-25, 2003.
- C86 Richard E. Schantz, Joseph P. Loyall, Douglas C. Schmidt, Craig Rodrigues, Yamuna Krishnamurthy, and Irfan Pyarali, "Flexible and Adaptive QoS Control for Distributed Real-time and Embedded Middleware," Proceedings of Middleware 2003, 4th IFIP/ACM/USENIX International Conference on Distributed Systems Platforms, June 16-20, 2003, Rio de Janeiro, Brazil.
- C85 Arvind Krishna, Douglas C. Schmidt, Raymond Klefstad, and Angelo Corsaro, "Towards Predictable Real-time Java Object Request Brokers," Proceedings of the 9th IEEE Real-time/Embedded Technology and Applications Symposium (RTAS), Washington DC, May 28-30, 2003.
- C84 Douglas C. Schmidt and Frank Buschmann, "Patterns, Frameworks, and Middleware: Their Synergistic Relationships," Proceedings of the IEEE/ACM International Conference on Software Engineering, Portland, Oregon, May 3-10, 2003.
- C83 Radu Cornea, Nikil Dutt, Rajesh Gupta, Ingolf Krueger, Alex Nicolau, Douglas C. Schmidt, and Sandeep Shukla, "FORGE: A Framework for Optimization of Distributed Embedded Systems Software," International Parallel and Distributed Processing Symposium, Nice, France, April 22-26 2003.
- C82 Raymond Klefstad, Sumita Rao, and Douglas C. Schmidt, "Design and Performance of a Dynamically Configurable, Messaging Protocols Framework for Real-time CORBA," Proceedings of the Distributed Object and Component-based Software Systems part of the Software Technology Track at the 36th Annual Hawaii International Conference on System Sciences, January 6-9, 2003, Big Island of Hawaii.
- C81 Raymond Klefstad, Arvind S. Krishna, and Douglas C. Schmidt, "Design and Performance of a Modular Portable Object Adapter for Distributed, Real-Time, Embedded CORBA Applications," Proceedings of the Distributed Objects and Applications (DOA) conference, Irvine, CA, October/November, 2002.
- C80 Chris Gill, Fred Kuhns, Douglas C. Schmidt, and Ron Cytron, "Empirical Differences Between COTS Middleware Scheduling Paradigms," Proceedings of the Distributed Objects and Applications (DOA) conference, Irvine, CA, October/November, 2002.
- C79 Angelo Corsaro and Douglas C. Schmidt, "jRate: The Chameleonic Real-Time Java Implementation," Proceedings of the Distributed Objects and Applications (DOA) conference, Irvine, CA, October/November, 2002.
- C78 Mayur Deshpande, Douglas C. Schmidt, Carlos O'Ryan, and Darrell Brunsch, "The Design and Performance of Asynchronous Method Handling for CORBA," Proceedings of the Distributed Objects and Applications (DOA) conference, Irvine, CA, October/November, 2002.
- C77 Irfan Pyarali, Douglas C. Schmidt, and Ron Cytron, "Achieving End-to-End Predictability of the TAO Real-time CORBA ORB," Proceedings of the 8<sup>th</sup> IEEE Real-Time Technology and Applications Symposium, San Jose, CA, September 2002.
- C76 Angelo Corsaro and Douglas C. Schmidt, "Evaluating Real-Time Java Features and Performance for Real-time Embedded Systems," Proceedings of the 8<sup>th</sup> IEEE Real-Time Technology and Applications Symposium, San Jose, CA, September 2002.
- C75 Angelo Corsaro, Douglas C. Schmidt, Raymond Klefstad, and Carlos O'Ryan, "Virtual Compo-

- ment: a Design Pattern for Memory-Constrained Embedded Applications,” Proceedings of the 9<sup>th</sup> Annual Conference on the Pattern Languages of Programs, Monticello, Illinois, September, 2002.
- C74 Joseph K. Cross and Douglas C. Schmidt, “Quality Connector: A Pattern Language for Provisioning and Managing Quality-Constrained Services in Distributed Real-time and Embedded Systems Proceedings of the 9th Annual Conference on the Pattern Languages of Programs, Monticello, Illinois, September, 2002.
- C73 Richard Schantz, Franklin Webber, Partha Pal, Joseph Loyall, and Douglas C. Schmidt, “Protecting Applications Against Malice with Adaptive Middleware,” Certification and Security in E-Services stream of the 17th IFIP World Computer Congress, Montreal, Canada, August 25-30, 2002.
- c72 Richard Schantz and Douglas C. Schmidt, “Research Advances in Middleware for Distributed Systems: State of the Art,” Computer Communications stream of the 17th IFIP World Computer Congress, Montreal, Canada, August 25-30, 2002.
- C71 Raymond Klefstad, Douglas C. Schmidt, and Carlos O’Ryan, “Towards Highly Configurable Real-time Object Request Brokers,” the IEEE International Symposium on Object-Oriented Real-time Distributed Computing (ISORC), Washington DC, April 29–May 1, 2002.
- C70 Angelo Corsaro, Douglas C. Schmidt, Chris Gill, and Ron Cytron, “Formalizing Meta-Programming Techniques to Reconcile Heterogeneous Scheduling Policies in Open Distributed Real-Time Systems,” Proceedings of the 3rd International Symposium on Distributed Objects and Applications, September 8-10, 2001, Rome, Italy.
- C69 David A. Karr, Craig Rodrigues, Yamuna Krishnamurthy, Irfan Pyarali, and Douglas C. Schmidt “Application of the QuO Quality-of-Service Framework to a Distributed Video Application,” Proceedings of the 3rd International Symposium on Distributed Objects and Applications, September 8-10, 2001, Rome, Italy.
- C68 Nanbor Wang, Kirthika Parameswaran, and Douglas C. Schmidt, “The Design and Performance of Meta-Programming Mechanisms for Object Request Broker Middleware,” Proceedings of the 6th USENIX Conference on Object-Oriented Technologies and Systems (COOTS), San Antonio, TX, Jan/Feb, 2001.
- C67 Andy Gokhale, Bala Natarajan, Douglas C. Schmidt and Shalini Yajnik, “Applying Patterns to Improve the Performance of Fault-Tolerant CORBA,” of the 7th International Conference on High Performance Computing (HiPC 2000), ACM/IEEE, Bangalore, India, December 2000.
- C66 Nanbor Wang, Michael Kircher, and Douglas C. Schmidt, “Applying Reflective Techniques to Optimize a QoS-enabled CORBA Component Model Implementation, the 24th Annual International Computer Software and Applications Conference (COMPSAC 2000), Taipei, Taiwan, October 25-27 2000.
- C65 Frederic Andres, Nicolas Dessaigne, Jose Martinez, Nouredine Mouaddib, Kinji Ono, Douglas C. Schmidt, Panrit Tosukhowong, “MISE: The MediaSys Image Search Engine,” 11th International Conference on Database and Expert Systems Applications (DEXA 2000), London, UK, September 2000.
- C64 Andy Gokhale, Bala Natarajan, Douglas C. Schmidt and Shalini Yajnik, “DOORS: Towards High-performance Fault-Tolerant CORBA,” Proceedings of the 2nd International Symposium on Distributed Objects and Applications (DOA ’00), OMG, Antwerp, Belgium, September 2000.
- C63 Irfan Pyarali, Carlos O’Ryan, Douglas C. Schmidt, “A Pattern Language for Efficient, Predictable, Scalable, and Flexible Dispatching Components,” Proceedings of the 7th Pattern Language of Programming Conference, Monticello, Illinois, August, 2000.
- C62 Douglas C. Schmidt, Carlos O’Ryan, Irfan Pyarali, Michael Kircher and Frank Buschmann, “Leader/Followers: A Design Pattern for Efficient Multi-threaded Event Demultiplexing and Dispatching,” Proceedings of the 7th Pattern Languages of Programming Conference, Monticello, Illinois, August 2000.
- C61 Carlos O’Ryan, Douglas C. Schmidt, Fred Kuhns, Marina Spivak, Jeff Parsons Irfan Pyarali, and David L. Levine, “Evaluating Policies and Mechanisms for Supporting Embedded, Real-Time Applications with CORBA 3.0,” Proceedings of the Sixth IEEE Real-Time Technology and Appli-

cations Symposium (RTAS'00), Washington D.C., USA, May 31-June 2, 2000.

- C60 Nanbor Wang, Douglas C. Schmidt, and David Levine, "Optimizing the CORBA Component Model for High-performance and Real-time Applications," Work-in-progress session of the IFIP/ACM Middleware 2000 Conference, Pallisades, New York, April 3-7, 2000.
- C59 Alexander B. Arulanthu, Carlos O'Ryan, Douglas C. Schmidt, Michael Kircher, and Jeff Parsons, "The Design and Performance of a Scalable ORB Architecture for CORBA Asynchronous Messaging," Proceedings of the IFIP/ACM Middleware 2000 Conference, Pallisades, New York, April 3-7, 2000.
- C58 Carlos O'Ryan, Fred Kuhns, Douglas C. Schmidt, Ossama Othman, and Jeff Parsons, The Design and Performance of a Pluggable Protocols Framework for Real-time Distributed Object Computing Middleware, Proceedings of the IFIP/ACM Middleware 2000 Conference, Pallisades, New York, April 3-7, 2000.
- C57 Irfan Pyarali, Carlos O'Ryan, and Douglas C. Schmidt, "A Pattern Language for Efficient, Predictable, Scalable, and Flexible Dispatching Mechanisms for Distributed Object Computing Middleware," Proceedings of the IEEE/IFIP International Symposium on Object-Oriented Real-time Distributed Computing, March 15-17, 2000, Newport Beach, California.
- C56 David Levine, Douglas C. Schmidt, and Sergio Flores-Gaitan, "An Empirical Evaluation of OS Support for Real-time CORBA Object Request Brokers," Proceedings of the Multimedia Computing and Networking 2000 (MMCN00) conference, ACM, San Jose, CA, January 25-27 2000.
- C55 Douglas C. Schmidt, "Middleware Techniques and Optimizations for Real-time, Embedded Systems," Proceedings of the 12th International Symposium On System Synthesis, IEEE, San Jose, CA, USA November, 11, 1999.
- C54 Panrit Tosukhowong, Frederic Andres, Kinji Ono, Nicolas Dessaigne, Josi Martinez, Nouredine Mouaddib, Douglas C. Schmidt, "A Flexible Image Search Engine," Proceedings of International Multimedia Conference Archive Proceedings of the Seventh ACM International Conference on Multimedia, Orlando, Florida, United States, November 1-5, 1999.
- C53 Bryan S. Doerr, Thomas Venturella, Rakesh Jha, Christopher D. Gill, and Douglas C. Schmidt, "Adaptive Scheduling for Real-time, Embedded Information Systems," Proceedings of the 18th IEEE/AIAA Digital Avionics Systems Conference (DASC), St. Louis, Missouri, October 24- 29, 1999.
- C52 Christopher D. Gill, David L. Levine, Carlos O'Ryan, and Douglas C. Schmidt, "Distributed Object Visualization for Sensor-Driven Systems," Proceedings of the 18th IEEE/AIAA Digital Avionics Systems Conference (DASC), St. Louis, Missouri, October 24-29, 1999.
- C51 Fred Kuhns, Douglas C. Schmidt, and David L. Levine, "The Performance of a Real-time I/O Subsystem for QoS-enabled ORB Middleware," Proceedings of the International Symposium on Distributed Objects and Applications (DOA '99), Edinburgh, Scotland, September 1999.
- C50 David L. Levine, Christopher D. Gill, and Douglas C. Schmidt, "Object Lifecycle Manager – A Complementary Pattern for Controlling Object Creation and Destruction." Proceedings of the 5th Pattern Languages of Programming Conference, Allerton Park, Illinois, USA, 15–18 August 1999.
- C49 Fred Kuhns, Douglas C. Schmidt, David Levine, and Rajeev Bector, "The Design and Performance of a Real-time I/O Subsystem," Proceedings of the 5th IEEE Real-Time Technology and Applications Symposium (RTAS99), Vancouver, British Columbia, Canada, June 2-4, 1999.
- C48 Irfan Pyarali, Carlos O'Ryan, Douglas C. Schmidt, Nanbor Wang, Vishal Kachroo, and Aniruddha Gokhale, "Applying Optimization Patterns to Design Real-time ORBs," Proceedings of the 5th USENIX Conference on Object-Oriented Technologies and Systems, May 3-7, 1999, San Diego, CA.
- C47 Andy Gokhale and Douglas C. Schmidt, "Techniques for Optimizing CORBA Middleware for Distributed Embedded Systems" Proceedings of INFOCOM '99, March 21-25th, New York, New York.
- C46 Sumedh Mungee, Nagarajan Surendran, and Douglas C. Schmidt, "The Design and Performance of a CORBA Audio/Video Streaming Service," Proceedings of the 31st Hawaii International Conference on System Systems (HICSS), Hawaii, January, 1999, minitrack on Multimedia

DBMS and the WWW, Hawaii, January 1999.

- C45 Chris D. Gill, David L. Levine, and Douglas C. Schmidt, "Dynamic Scheduling for Avionics Applications," Proceedings of the 17th IEEE/AIAA Digital Avionics System Conference, 31 October - 6 November 1998.
- C44 James Hu, Irfan Pyarali, and Douglas C. Schmidt, "Applying the Proactor Pattern to High-Performance Web Servers," Proceedings of the 10th International Conference on Parallel and Distributed Computing and Systems, IASTED, Las Vegas, Nevada, October 28-31, 1998.
- C43 Douglas C. Schmidt, Sumedh Mungee, and Andy Gokhale, "Alleviating Priority Inversion and Non-determinism in Real-time CORBA ORB Core Architectures," Proceedings of the Fourth IEEE Real-Time Technology and Applications Symposium (RTAS), Denver, Colorado, June 3-5, 1998.
- C42 Prashant Jain, Seth Widoff, and Douglas C. Schmidt, "The Design and Performance of Med-Java, A Distributed Electronic Medical Imaging System Developed with Java Applets and Web Tools" Proceedings of the 4th USENIX Conference on Object-Oriented Technologies and Systems, Sante Fe, New Mexico, April 1998. This was selected as the best student paper in the conference.
- C41 James Hu, Sumedh Mungee, and Douglas C. Schmidt, "Techniques for Developing and Measuring High-performance Web Servers over ATM Networks," Proceedings of INFOCOM '98, San Francisco, March/April, 1998.
- C40 Aniruddha Gokhale and Douglas C. Schmidt, "Optimizing the Performance of the CORBA Internet Inter-ORB Protocol Over ATM," Proceedings of the 31st Hawaii International Conference on System Systems (HICSS), Hawaii, January, 1998. This was selected as the best paper in the Software Technology Track (188 submitted, 77 accepted).
- C39 Aniruddha Gokhale and Douglas C. Schmidt, "Evaluating the Performance of Demultiplexing Strategies for Real-time CORBA," Proceedings of GLOBECOM '97 conference, IEEE, Phoenix, AZ, November, 1997.
- C38 James Hu, Irfan Pyarali, and Douglas C. Schmidt, "Measuring the Impact of Event Dispatching and Concurrency Models on Web Server Performance Over High-speed Networks," Proceedings of the 2nd Global Internet Conference (held as part of GLOBECOM '97) in Phoenix, AZ, November 4-8, 1997.
- C37 Tim Harrison, David Levine, and Douglas C. Schmidt, "The Design and Performance of a Real-time CORBA Event Service," Proceedings of OOPSLA '97, ACM, Atlanta, GA, October 1997.
- C36 Aniruddha Gokhale and Douglas C. Schmidt and Stan Moyer, "Tools for Automating the Migration from DCE to CORBA," Proceedings of ISS 97: World Telecommunications Congress, IEEE Toronto, Canada, September, 1997.
- C35 Prashant Jain and Douglas C. Schmidt, "Service Configurator – A Pattern for Dynamic Configuration of Services," the 4th annual Pattern Languages of Programming conference in Allerton Park, Illinois, September 1997.
- C34 Chris Cleeland, Douglas C. Schmidt, and Tim H. Harrison, "External Polymorphism – An Object Structural Pattern for Transparently Extending C++ Concrete Data Types," the 4th annual Pattern Languages of Programming conference in Allerton Park, Illinois, September 1997.
- C33 Douglas C. Schmidt, Tim H. Harrison, and Nat Pryce, "Thread-specific Storage: an Object Behavioral Pattern for Efficiently Accessing per-Thread State," The 4th annual Pattern Languages of Programming conference in Allerton Park, Illinois, September 1997.
- C32 Irfan Pyarali, Tim Harrison, Douglas C. Schmidt, and Thomas Jordan, "Proactor: an Object Behavioral Pattern for Demultiplexing and Dispatching Handlers for Asynchronous Events," the 4th annual Pattern Languages of Programming conference in Allerton Park, Illinois, September 1997.
- C31 Prashant Jain and Douglas C. Schmidt, "Service Configurator – A Pattern for Dynamic Configuration of Services," Proceedings of the 3rd Conference on Object-Oriented Technologies and Systems, USENIX, Portland, OR, June 16-19, 1997.
- C30 Aniruddha Gokhale and Douglas C. Schmidt, "Evaluating Latency and Scalability of CORBA Over High-Speed ATM Networks," Proceedings of the International Conference on Distributed Com-

puting Systems '97, IEEE, Baltimore, Maryland, May 27–30, 1997.

- C29 Aniruddha Gokhale and Douglas C. Schmidt, "Performance of the CORBA Dynamic Invocation Interface and Internet Inter-ORB Protocol over High-Speed ATM Networks," *Proceedings of GLOBECOM '96*, IEEE, London England, November, 1996.
- C28 Aniruddha Gokhale and Douglas C. Schmidt, "Measuring the Performance of Communication Middleware on High-Speed Networks," *Proceedings of SIGCOMM '96*, ACM, San Francisco, August 28-30th, 1996.
- C27 Irfan Pyarali, Tim Harrison, and Douglas C. Schmidt, "Design and Performance of an Object-Oriented Framework for High-Speed Electronic Medical Imaging," *Proceedings of the 2nd Conference on Object-Oriented Technologies and Systems (COOTS)*, USENIX, Toronto, June 18-22, 1996.
- C26 Douglas C. Schmidt, "A Family of Design Patterns For Flexibly Configuring Network Services in Distributed Systems," *Proceedings of the International Conference on Configurable Distributed Systems*, IEEE, Annapolis, Maryland, May 6-8, 1996.
- C25 Douglas C. Schmidt "Using Design Patterns to Develop High-Performance Object-Oriented Communication Software Frameworks," *Proceedings of the 8th Annual Software Technology Conference*, Salt Lake City, Utah, April 21-26, 1996.
- C24 Douglas C. Schmidt, Timothy H. Harrison, and Irfan Pyarali, "An Object-Oriented Framework for High-Performance Electronic Medical Imaging," *Proceedings of the Very High Resolution and Quality Imaging mini-conference at the Symposium on Electronic Imaging in the International Symposia Photonics West 1996*, SPIE, San Jose, California USA, January 27 - February 2, 1996.
- C23 Douglas C. Schmidt and Charles D. Cranor, "Half-Sync/Half-Async: A Pattern for Efficient and Well-structured Concurrent I/O," *The 2nd Pattern Languages of Programs Conference* Monticello, Illinois, September 6-8, 1995.
- C22 R. Greg Lavender and Douglas C. Schmidt, "Active Object: An Object Behavioral Pattern for Concurrent Programming," *The 2nd Pattern Languages of Programs Conference*, Monticello, Illinois, September 6-8, 1995.
- C21 Guru Parulkar, Douglas C. Schmidt, and Jonathan S. Turner, " $a_tP_m$ : a Strategy for Integrating IP with ATM," the Symposium on Communications Architectures and Protocols (SIGCOMM), ACM, Cambridge, MA, August 30 to September 1, 1995.
- C20 Douglas C. Schmidt, Tim Harrison, and Ehab Al-Shaer, "Object-Oriented Components for High-speed Network Programming," *Proceedings of the Conference on Object-Oriented Technologies (COOTS)*, USENIX, June 26-29, 1995 Monterey, California, USA, pp. 21-38.
- C19 Douglas C. Schmidt and Paul Stephenson, "Experience Using Design Patterns to Evolve Communication Software Across Diverse OS Platforms," *Proceedings of the 9th European Conference on Object-Oriented Programming (ECOOP)*, ACM, Aarhus, Denmark, August, 1995.
- C18 Douglas C. Schmidt and Tatsuya Suda, "Measuring the Performance of Parallel Message-based Process Architectures," *Proceedings of the INFOCOM Conference on Computer Communications*, IEEE, Boston, MA, April, 1995, pp. 624-633.
- C17 Douglas C. Schmidt and Tatsuya Suda, "Experiences with an Object-Oriented Architecture for Developing Dynamically Extensible Network Management Software," *Proceedings of the Globecom Conference*, IEEE, San Francisco, California, November, 1994, pp. 1-7.
- C16 Douglas C. Schmidt and Paul Stephenson, "Achieving Reuse Through Design Patterns," *Proceedings of the 3rd Annual C++ World Conference*, SIGS, Austin, Texas, November 14-18, 1994.
- C15 Douglas C. Schmidt, "Developing Object-Oriented Frameworks to Dynamically Configure Concurrent, Multi-service Network Daemons," *Proceedings of the 3rd Annual C++ World Conference*, SIGS, Austin, Texas, November 14-18, 1994.
- C14 Douglas C. Schmidt, "Reactor: An Object Behavioral Pattern for Concurrent Event Demultiplexing and Dispatching," *The 1st Annual Conference on the Pattern Languages of Programs*, Monticello, Illinois, August, 1994, pp. 1-10.
- C13 Douglas C. Schmidt, "The ADAPTIVE Communication Environment: An Object-Oriented Network Programming Toolkit for Developing Communication Software," *Proceedings of the 12th An-*

*nual Sun Users Group Conference*, SUG, San Francisco, June 16-17, 1994. This paper won the “best student paper” award at the conference.

- C12 Douglas C. Schmidt, Burkhard Stiller, Tatsuya Suda, and Martina Zitterbart, “Configuring Function-based Communication Protocols for Distributed Applications,” *Proceedings of the 8th International Working Conference on Upper Layer Protocols, Architectures, and Applications*, IFIP, Barcelona, Spain, June 1-3, 1994, pp. 361-376.
- C11 Douglas C. Schmidt and Tatsuya Suda, “The ADAPTIVE Service Executive: An Object-Oriented Architecture for Configuring Concurrent Distributed Communication Systems,” *Proceedings of the 8th International Working Conference on Upper Layer Protocols, Architectures, and Applications*, IFIP, Barcelona, Spain, June 1-3, 1994, pp. 163-178.
- C10 Douglas C. Schmidt, “ASX: An Object-Oriented Framework for Developing Distributed Applications,” *Proceedings of the 6th C++ Conference*, USENIX, Cambridge, Massachusetts, April, 1994, pp. 200-220.
- C9 Douglas C. Schmidt, “The ADAPTIVE Communication Environment: Object-Oriented Network Programming Components for Developing Client/Server Applications,” *Proceedings of the 11th Annual Sun Users Group Conference*, SUG, San Jose, December 7-9, 1993, pp. 214-225. This paper won the “best student paper” award at the conference.
- C8 Douglas C. Schmidt and Paul Stephenson, “An Object-Oriented Framework for Developing Network Server Daemons,” *Proceedings of the 2nd Annual C++ World Conference*, SIGS, Dallas, Texas, October 18-22, 1993, pp. 73-85.
- C7 Douglas C. Schmidt, “Object-Oriented Techniques for Developing Extensible Network Servers,” *Proceedings of the 2nd Annual C++ World Conference*, SIGS, Dallas, Texas, October 18-22, 1993.
- C6 Douglas C. Schmidt, Burkhard Stiller, Tatsuya Suda, Ahmed Tantawy, and Martina Zitterbart, “Configuration Support for Flexible Function-Based Communication Systems,” *Proceedings of the 18th Conference on Local Computer Networks*, IEEE, Minneapolis, Minnesota, September 20-22, 1993, pp. 369-378.
- C5 Douglas C. Schmidt and Tatsuya Suda, “ADAPTIVE: a Framework for Experimenting with High-Performance Transport System Process Architectures,” *Proceedings of the 2nd International Conference on Computer Communications and Networks*, ISCA, San Diego, California, June 28-30, 1993, pp. 1-8.
- C4 Donald F. Box, Douglas C. Schmidt, and Tatsuya Suda, “ADAPTIVE: An Object-Oriented Framework for Flexible and Adaptive Communication Protocols,” *Proceedings of the 4th Conference on High Performance Networking*, IFIP, Liege, Belgium, December 14-18, 1992, pp. 367-382.
- C3 Douglas C. Schmidt, Donald F. Box, and Tatsuya Suda, “ADAPTIVE: A Flexible and Adaptive Transport System Architecture to Support Lightweight Protocols for Multimedia Applications on High-Speed Networks,” *Proceedings of the 1st Symposium on High Performance Distributed Computing*, IEEE, Syracuse, New York, September 9-11, 1992, pp. 174-186.
- C2 Richard W. Selby, Adam A. Porter, Douglas C. Schmidt, and James Berney, “Metric-Driven Analysis and Feedback Systems for Enabling Empirically Guided Software Development,” *Proceedings of the 13th Annual International Conference on Software Engineering*, IEEE, Austin, Texas, May, 1991, pp. 430-443.
- C1 Douglas C. Schmidt “GPERF: A Perfect Hash Function Generator,” *Proceedings of the 2nd C++ Conference*, USENIX, San Francisco, California, April 9-11, 1990, pp. 87-102.

#### • Refereed Workshop Publications

- W75 Sklyer Grandel, Douglas C. Schmidt, and Kevin Leach “Applying Large Language Models to Enhance the Assessment of Parallel Functional Programming Assignments,” *Proceedings of the 2024 International Workshop on Large Language Models for Code*, Lisbon, Portugal, 20 April 2024.
- W74 Nick Guertin, Douglas C. Schmidt, and Harry Levinson, “Business and Organizational Impacts for Modular Flexible Ships,” *Proceedings of the 2018 Design Sciences Series Workshop on Modular Adaptable Ships*, Washington DC, November 14-15, 2018.
- W73 Michael Walker, Abhishek Dubey, Aron Laszka, and Douglas C. Schmidt, “PlaTIBART: a Plat-

- form for Transactive IoT Blockchain Applications with Repeatable Testing,” Proceedings of the ACM/IFIP/USENIX 4th Workshop on Middleware and Applications for the Internet of Things, December 2017, Las Vegas, USA.
- W72 Abhishek Dubey, Subhav Pradhan, Douglas C. Schmidt, Sebnem Rusitschka, and Monika Sturm, “The Role of Context and Resilient Middleware in Next Generation Smart Grids,” Proceedings of the 3rd Middleware for Context-Aware Applications in the IoT (M4IOT 2016) Workshop at the ACM/IFIP/USENIX Middleware 2016 Conference, Dec 12 - 16, 2016, Trento, Italy.
- W71 Violetta Vylegzhanina, Douglas C. Schmidt, and Jules White, “Gaps and Future Directions in Mobile Security Research,” Proceedings of the Third International Workshop on Mobile Development Lifecycle, Pittsburgh, PA, October 26th, 2015.
- W70 Violetta Vylegzhanina, Douglas C. Schmidt, Pamela Hull, Janice S. Emerson, Meghan E. Quirk, and Shelagh Mulvaney, “Helping Children Eat Well Via Mobile Software Technologies,” Proceedings of the Second International Workshop on Mobile Development Lifecycle, October 21st, 2015, Portland, OR.
- W69 Jules White and Douglas C. Schmidt, “R&D Challenges and Emerging Solutions for Multicore Deployment/Configuration Optimization,” proceedings of the ACM Workshop on Future of Software Engineering Research (FoSER 2010), Santa Fe, NM, November 7-11, 2010.
- W68 Will Otte, Douglas C. Schmidt, and Aniruddha Gokhale, “Towards an Adaptive Deployment and Configuration Framework for Component-based Distributed Systems,” Proceedings of the 9th Workshop on Adaptive and Reflective Middleware (ARM 2010) November 27, 2010, Bangalore India, collocated with Middleware 2010.
- W67 Jaiganesh Balasubramanian, Alexander Mintz, Andrew Kaplan, Grigory Vilkov, Artem Gleyzer, Antony Kaplan, Ron Guida, Pooja Varshneya and Douglas Schmidt, “Adaptive Parallel Computing for Large-scale Distributed and Parallel Applications,” Proceedings of the Workshop on Data Dissemination for Large-scale Complex Critical Infrastructures (DD4LCCI), 27 April 2010, in conjunction with EDCC 2010, Valencia - Spain, April 28-30, 2010.
- W66 Joe Hoffert, Douglas Schmidt, and Aniruddha Gokhale, “Adapting and Evaluating Distributed Real-time and Embedded Systems in Dynamic Environments,” Proceedings of the Workshop on Data Dissemination for Large-scale Complex Critical Infrastructures (DD4LCCI), 27 April 2010, in conjunction with EDCC 2010, Valencia - Spain, April 28-30, 2010.
- W65 Joe Hoffert, Dan Mack, and Douglas C. Schmidt, “Using Machine Learning to Maintain Pub/Sub System QoS in Dynamic Environments, Proceedings of the 8th Workshop on Adaptive and Reflective Middleware (ARM’09) December 1st 2009, Urbana Champaign, Illinois, USA collocated with Middleware 2009.
- W64 Chris Thompson, Jules White, Brian Dougherty, and Douglas C. Schmidt, “Optimizing Mobile Application Performance with Model-Driven Engineering,” Proceedings of the 7th IFIP Workshop on Software Technologies for Future Embedded and Ubiquitous Systems (SEUS 2009), November 16-18, 2009, Newport Beach, California.
- W63 Jules White and Douglas C. Schmidt, “Filtered Cartesian Flattening: An Approximation Technique for Optimally Selecting Features while Adhering to Resource Constraints,” proceedings of the Workshop on Analyses of Software Product Lines (ASPL 2008) at the Software Product Lines Conference (SPLC), September 8-12, 2008, Limerick, Ireland.
- W62 Joe Hoffert, Douglas C. Schmidt, Mahesh Balakrishnan, and Ken Birman, Supporting Large-scale Continuous Stream Datacenters via Pub/Sub Middleware and Adaptive Transport Protocols, Proceedings of the 2nd workshop on Large-Scale Distributed Systems and Middleware (LADIS 2008), IBM TJ Watson Research Center, Yorktown, New York, September 2008.
- W61 Nishanth Shankaran, John S. Kinnebrew, Xenofon D. Koutsoukos, Chenyang Lu, Douglas C. Schmidt, and Gautam Biswas, Towards an Integrated Planning and Adaptive Resource Management Architecture for Distributed Real-time Embedded Systems,” Proceedings of the Workshop on Adaptive and Reconfigurable Embedded Systems (APRES) at the 14th IEEE Real-Time and Embedded Technology and Applications Symposium, St. Louis, MO, United States, April 22 - April 24, 2008.
- W60 Serena Fritsch, Aline Senart, Douglas C. Schmidt, and Siobhan Clarke, “Scheduling Time-bound Dynamic Software Adaptation,” Proceedings of the workshop on Software Engineering for

Adaptive and Self-Managing Systems at the 30th IEEE/ACM International Conference on Software Engineering May 12-13, 2008, Leipzig, Germany.

- W59 James Hill, Jules White, Sean Eade, and Douglas C. Schmidt, "Towards a Solution for Synchronizing Disparate Models of Ultra-Large-Scale Systems," Proceedings of the Second International Workshop on Ultra-Large-Scale Software-Intensive Systems at the 30th IEEE/ACM International Conference on Software Engineering May 10-11, 2008, Leipzig, Germany.
- W58 Douglas C. Schmidt and Hans van't Hag, "Addressing the Challenges of Tactical Information Management in Net-Centric Systems with OpenSplice DDS," Proceedings of the 16th International ACM Workshop on Parallel and Distributed Real-Time Systems (WPDRTS '08), Miami, Florida, April 2008.
- W57 Shanshan Jiang, Yuan Xue, and Douglas C. Schmidt, "Disruption-Aware Service Composition and Recovery in Dynamic Networking Environments," Workshop on Automating Service Quality (WRAQS) 2007, Co-Located with ASE 2007 November 6, 2007, Atlanta, Georgia.
- W56 Jules White, Douglas C. Schmidt, Sean Mulligan, "The Generic Eclipse Modeling System," Model-Driven Development Tool Implementer's Forum, TOOLS '07, June, 2007, Zurich, Switzerland.
- W55 John S. Kinnebrew, Nishanth Shankaran, Gautam Biswas, and Douglas C. Schmidt, A Decision-Theoretic Planner with Dynamic Component Reconfiguration for Distributed Real-time and Embedded Systems, Proceedings of the Workshop on Artificial Intelligence for Space Applications at IJCAI 2007, January 6-12, 2007, Hyderabad, India.
- W54 Andrey Nechypurenko, Jules White, Egon Wuchner, and Douglas C. Schmidt, "Applying Model Intelligence Frameworks for Deployment Problem in Real-time and Embedded Systems," Proceedings of MARTES: Modeling and Analysis of Real-Time and Embedded Systems to be held on October 2, 2006 in Genova, Italy in conjunction with the 9th International Conference on Model Driven Engineering Languages and Systems, MoDELS/UML 2006.
- W53 Jules White, Andrey Nechypurenko, Egon Wuchner, and Douglas C. Schmidt, "Intelligence Frameworks for Assisting Modelers in Combinatorically Challenging Domains," Proceedings of the Workshop on Generative Programming and Component Engineering for QoS Provisioning in Distributed Systems, October 23, 2006, Portland, Oregon.
- W52 Nishanth Shankaran, Xenofon Koutsoukos, Douglas C. Schmidt, and Aniruddha Gokhale, "Evaluating Adaptive Resource Management for Distributed Real-Time Embedded Systems," Proceedings of the 4th Workshop on Adaptive and Reflective Middleware, November 28, 2005 Grenoble, France.
- W51 Jules White and Douglas Schmidt, "Simplifying the Development of Product-line Customization Tools via Model Driven Development," MODELS 2005 workshop on MDD for Software Product-lines: Fact or Fiction?, October 2, 2005, Jamaica.
- W50 Arvind S. Krishna, Aniruddha Gokhale, Douglas C. Schmidt, Venkatesh Prasad Ranganath, and John Hatcliff, "Model-driven Middleware Specialization Techniques for Software Product-line Architectures in Distributed Real-time and Embedded Systems," MODELS 2005 workshop on MDD for Software Product-lines: Fact or Fiction?, October 2, 2005, Jamaica.
- W49 Gen Deng, Gunther Lenz, and Douglas C. Schmidt, "Addressing Domain Evolution Challenges in Model-Driven Software Product-line Architectures," MODELS 2005 workshop on MDD for Software Product-lines: Fact or Fiction?, October 2, 2005, Jamaica.
- W48 Andrey Nechypurenko and Douglas C. Schmidt, "Supporting Model Reusability with Pattern-based Composition Units," Proceedings of the IST 2nd European Workshop on Model Driven Architecture (MDA), with an emphasis on Methodologies and Transformations September 7th-8th 2004, Canterbury, England.
- W47 Cemal Yilmaz, Arvind S. Krishna, Atif Memon, Adam Porter, Douglas C. Schmidt, Aniruddha Gokhale, and Balachandran Natarajan, "A Model-based Distributed Continuous Quality Assurance Process to Enhance the Quality of Service of Evolving Performance-intensive Software Systems," Proceedings of the 2nd ICSE Workshop on Remote Analysis and Measurement of Software Systems (RAMSS), Edinburgh, Scotland, UK, May 24, 2004.
- W46 Andrey Nechypurenko, Douglas C. Schmidt, Tao Lu, Gan Deng, Aniruddha Gokhale, "Applying MDA and Component Middleware to Large-scale Distributed Systems: a Case Study, Proceedings of the OMG 1st European Workshop on Model Driven Architecture with Emphasis on In-

dustrial Application, Enschede, the Netherlands, March 2004.

- W45 Gan Deng, Tao Lu, Emre Turkay, Aniruddha Gokhale, Douglas C. Schmidt, and Andrey Nechypurenko, "Model Driven Development of Inventory Tracking System," Proceedings of the OOPSLA 2003 Workshop on Domain-Specific Modeling Languages, Anaheim, CA, October 2003.
- W44 Tao Lu, Emre Turkay, Aniruddha Gokhale, and Douglas C. Schmidt, "CoSMIC: An MDA Tool suite for Application Deployment and Configuration," Proceedings of the OOPSLA 2003 Workshop on Generative Techniques in the Context of Model Driven Architecture, Anaheim, CA, October 2003.
- W43 Arvind S. Krishna, Jai Balasubramanian, Aniruddha Gokhale, Douglas C. Schmidt, Diego Sevilla, and Gautham Thaker, "Empirically Evaluating CORBA Component Model Implementations," Proceedings of the ACM OOPSLA 2003 Workshop on Middleware Benchmarking, Anaheim, CA, October 2003.
- W42 Aniruddha Gokhale, Douglas C. Schmidt, Tao Lu, Balachandran Natarjan, and Nanbor Wang, CoSMIC: An MDA Generative Tool for Distributed Real-time and Embedded Applications, Workshop on Model-driven Approaches to Middleware Applications Development at 4th IFIP/ACM/USENIX International Conference on Middleware for Distributed Systems Platforms, June 16, 2003, Rio de Janeiro, Brazil.
- W41 Ossama Othman, Jaigaesh Balasubramanian, and Douglas C. Schmidt, "The Design and Performance of an Adaptive Middleware Load Balancing and Monitoring Service," Third International Workshop on Self-Adaptive Software, Arlington, VA, USA, June 9-11, 2003.
- W40 Radu Cornea, Shivajit Mohapatra, Nikil Dutt, Rajesh Gupta, Ingolf Krueger, Alex Nicolau, Doug Schmidt, Sandeep Shukla, and Nalini Venkatasubramanian, "A Model-Based Approach to System Specification for Distributed Real-time and Embedded Systems," IEEE RTAS Workshop on Model-Driven Embedded Systems, Washington DC, May 27-30, 2003.
- W39 Adam Porter, Cemal Yilmaz, and Douglas C. Schmidt "Distributed Continuous Quality Assurance: The Skoll Project," Proceedings of the Workshop on Remote Analysis and Measurement of Software Systems (RAMSS), Portland, Oregon, May 9, 2003.
- W38 Krishnakumar Balasubramanian, Douglas C. Schmidt, Nanbor Wang, Christopher D. Gill, "Towards Composable Distributed Real-time and Embedded Software," Proceedings of the 8<sup>th</sup> IEEE Workshop on Object-oriented Real-time Dependable Systems, Guadalajara, Mexico, January 2003.
- W37 Aniruddha Gokhale, Balachandran Natarjan, Douglas C. Schmidt, Andrey Nechypurenko, Nanbor Wang, Jeff Gray, Sandeep Neema, Ted Bapty, and Jeff Parsons, "CoSMIC: An MDA Generative Tool for Distributed Real-time and Embedded Component Middleware and Applications," Proceedings of the OOPSLA 2002 Workshop on Generative Techniques in the Context of Model Driven Architecture, Seattle, WA, November 2002.
- W36 M. Mousavi, G. Russello, M. Chaudron, M. Reniers, T. Basten, A. Corsaro, S. Shukla, R. Gupta, and D.C. Schmidt, "Using Aspect-GAMMA in Design and Verification of Embedded Systems," Proceedings of the Seventh Annual IEEE International Workshop on High Level Design Validation and Test Workshop, Cannes, France, October 27-29, 2002.
- W35 Douglas C. Schmidt, Andy Gokhale, and Chris Gill, "Applying Model-Integrated Computing and DRE Middleware to High Performance Embedded Computing Applications," Proceedings of the 6th Annual Workshop on High-Performance Embedded Computing (HPEC), September 24-26, Boston, MA.
- W34 Douglas C. Schmidt, "Adaptive and Reflective Middleware for Distributed Real-time and Embedded Systems," EMSOFT 2002: Second Workshop on Embedded Software, Grenoble, France, October, 7-9th, 2002.
- W33 Aniruddha S. Gokhale and Douglas C. Schmidt and Joseph K. Cross and Christopher Andrews and Sylvester J. Fernandez and Bala Natarajan and Nanbor Wang and Chris D. Gill, "Towards Real-time Support in Fault-tolerant CORBA," IEEE Workshop on Dependable Middleware-Based Systems, Washington, D.C., June 23-26, 2002.
- W32 Chris Gill, Joe Loyall, Rick Schantz, and Douglas C. Schmidt, "Lessons Learned From Using Adaptive DOC Middleware in Real Application Contexts," IEEE Workshop on Dependable Middle-

ware-Based Systems, Washington, D.C., June 23-26, 2002.

- W31 M. Mousavi, G. Russello, M. Chaudron, M. Reniers, T. Basten, A. Corsaro, S. Shukla, R. Gupta, and D.C. Schmidt, "Aspects + GAMMA = AspectGAMMA: A Formal Framework for Aspect-Oriented Specification," Proceedings of Early Aspects: Aspect-Oriented Requirements Engineering and Architecture Design Workshop, Enschede, The Netherlands, April 2002.
- W30 Joseph K. Cross and Douglas C. Schmidt, "Meta-Programming Techniques for Distributed Real-time and Embedded Systems," Proceedings of the 7th IEEE Workshop on Object-oriented Real-time Dependable Systems, San Diego, CA, January, 2002.
- W29 Douglas C. Schmidt and Mayur Deshpande and Carlos O'Ryan, "Operating System Performance in Support of Real-time Middleware," Proceedings of the 7th IEEE Workshop on Object-oriented Real-time Dependable Systems, San Diego, CA, January, 2002.
- W28 Christopher D. Gill, Ron Cytron, and Douglas C. Schmidt, "Middleware Scheduling Optimization Techniques for Distributed Real-Time and Embedded Systems," Proceedings of the 7th IEEE Workshop on Object-oriented Real-time Dependable Systems, San Diego, CA, January, 2002.
- W27 Douglas C. Schmidt, "Adaptive and Reflective Middleware for Distributed Real-time and Embedded Systems," EMSOFT 2001: First Workshop on Embedded Software, Lake Tahoe, California, October, 8th-10th, 2001.
- W26 Darrell Brunsch, Carlos O'Ryan, and Douglas C. Schmidt, "Designing an Efficient and Scalable Server-side Asynchrony Model for CORBA," Proceedings of the ACM SIGPLAN Workshop on Optimization of Middleware and Distributed Systems (OM 2001), Snowbird, Utah, June 18, 2001.
- W25 Irfan Pyarali, Marina Spivak, Douglas C. Schmidt, and Ron Cytron, "Optimizing Thread-Pool Strategies for Real-Time CORBA," Proceedings of the ACM SIGPLAN Workshop on Optimization of Middleware and Distributed Systems (OM 2001), Snowbird, Utah, June 18, 2001.
- W24 Yamuna Krishnamurthy, Vishal Kachroo, David A. Karr, Craig Rodrigues, Joseph P. Loyall, Richard Schantz, and Douglas C. Schmidt, "Integration of QoS-enabled Distributed Object Computing Middleware for Developing Next-generation Distributed Applications," Proceedings of the ACM SIGPLAN Workshop on Optimization of Middleware and Distributed Systems (OM 2001), Snowbird, Utah, June 18, 2001.
- W23 Ossama Othman and Douglas C. Schmidt, "Optimizing Distributed system Performance via Adaptive Middleware Load Balancing," Proceedings of the ACM SIGPLAN Workshop on Optimization of Middleware and Distributed Systems (OM 2001), Snowbird, Utah, June 18, 2001.
- W22 Pradeep Gore, Douglas C. Schmidt, Carlos O'Ryan, and Ron Cytron, "Designing and Optimizing a Scalable CORBA Notification Service," Proceedings of the ACM SIGPLAN Workshop on Optimization of Middleware and Distributed Systems (OM 2001), Snowbird, Utah, June 18, 2001.
- W21 Douglas C. Schmidt and Adam Porter, "Leveraging Open-Source Processes to Improve the Quality and Performance of Open-Source Software," Proceedings of the 1st Workshop on Open Source Software Engineering, ICSE 23, Toronto, Canada, May 15, 2001.
- W20 Christopher D. Gill, David Levine, Douglas C. Schmidt, "Towards Real-Time Adaptive QoS Management in Middleware for Embedded Computing Systems," Fourth Annual Workshop on High Performance Embedded Computing, MIT Lincoln Laboratory, September 20-22, 2000.
- W19 Christopher D. Gill, Fred Kuhns, David Levine, Douglas C. Schmidt, Bryan S. Doerr, and Richard E. Schantz, "Applying Adaptive Real-time Middleware to Address Grand Challenges of COTS-based Mission-Critical Real-Time Systems," Proceedings of the 1st International Workshop on Real-Time Mission-Critical Systems: Grand Challenge Problems, IEEE, Phoenix, Arizona, November 30, 1999.
- W18 Carlos O'Ryan, Douglas C. Schmidt, David Levine, and Russell Noseworthy, "Applying a Real-time CORBA Event Service to Large-scale Distributed Interactive Simulation," 5th International Workshop on Object-oriented Real-time Dependable Systems, IEEE, Monterey, CA, November 15-18, 1999.
- W17 Fred Kuhns, Carlos O'Ryan, Douglas C. Schmidt, and Jeff Parsons, "The Design and Performance

- of a Pluggable Protocols Framework for Object Request Broker Middleware," Proceedings of the IFIP Sixth International Workshop on Protocols For High-Speed Networks (PfHSN '99), Salem, MA, August 25-27, 1999.
- W16 David Levine, Sergio Flores-Gaitan, and Douglas C. Schmidt, "Measuring OS Support for Real-time CORBA ORBs," Proceedings of the Fourth International IEEE Workshop on Object-oriented Real-time Dependable Systems (WORDS'99), Santa Barbara, California, January 27-29, 1999.
- W15 Douglas C. Schmidt, Rajeev Bector, David Levine Sumedh Mungee, and Guru Parulkar, "TAO: a Middleware Framework for Real-time ORB Endsytams," Proceedings of the Workshop on Middleware for Real-Time Systems and Services, held in conjunction with IEEE Real-time Systems Symposium, San Francisco, CA, December 2nd, 1997.
- W14 Aniruddha Gokhale, Tim Harrison, Douglas C. Schmidt, and Guru Parulkar, "Operating System Support for High-performance, Real-time CORBA," *Proceedings of the 5th International Workshop on Object-Orientation in Operating Systems: IWOOS 1996 workshop*, October 27-28, 1996, Seattle, Washington.
- W13 Douglas C. Schmidt, Guru Parulkar, and Chuck Cranor, "Gigabit CORBA - High-Performance Distributed Object Computing," Gigabit Networking Workshop (GBN'96), 24 March 1996, San Francisco, in conjunction with INFOCOM '96.
- W12 Douglas C. Schmidt, "Acceptor and Connector: Design Patterns for Actively and Passively Initializing Network Services." Workshop on Pattern Languages of Object-Oriented Programs at ECOOP '95, August 7-1, 1995, Aarhus, Denmark.
- W11 Douglas C. Schmidt, "High-Performance Event Filtering for Dynamic Multi-point Applications," Proceedings of the 1st Workshop on High Performance Protocol Architectures (HIP- PARCH), INRIA, Sophia Antipolis, France, December, 1994, p 1-8.
- W10 Douglas C. Schmidt, "Flexible Configuration of High-Performance Object-Oriented Distributed Communication Systems," 9th OOPSLA Conference, invited paper to the Workshop on Flexibility in Systems Software, ACM, Portland, Oregon, October, 1994, pp. 1-4.
- W9 Douglas C. Schmidt and Tatsuya Suda, "Measuring the Impact of Alternative Parallel Process Architectures on Communication Subsystem Performance," *Proceedings of the Proceedings of the 4th International Workshop on Protocols for High-Speed Networks*, IFIP, Vancouver, British Columbia, August, 1994, pp. 103-118.
- W8 Douglas C. Schmidt and Tatsuya Suda, "The Service Configurator Framework: An Extensible Architecture for Dynamically Configuring Concurrent, Multi-service Network Daemons," *Proceedings of the 2nd International Workshop on Configurable Distributed Systems*, IEEE, Pittsburgh, PA, March 21-23, 1994, pp. 190-201.
- W7 Douglas C. Schmidt, Burkhard Stiller, Tatsuya Suda, and Martina Zitterbart, "Tools for Generating Application-Tailored Multimedia Protocols on Heterogeneous Multi-Processor Platforms," *Proceedings of the 2nd Workshop on High-Performance Communications Subsystems*, IEEE, Williamsburg, Virginia, September 1-3, 1993, pp. 1-7.
- W6 Douglas C. Schmidt and Tatsuya Suda, "A Framework for Developing and Experimenting with Parallel Process Architectures to Support High-Performance Transport Systems," *Proceedings of the 2nd Workshop on High-Performance Communications Subsystems*, IEEE, Williamsburg, Virginia, September 1-3, 1993, pp. 1-8.
- W5 Tatsuya Suda, Douglas C. Schmidt, Donald F. Box, Duke Hong and Hung Huang, "High Speed Networks," *Proceedings of the International Computer World Symposium '92*, Kobe, Japan, November, 1992.
- W4 Hung K. Huang, Douglas C. Schmidt, Donald F. Box, Kazu Shimono, Girish Kotmire, Unmesh Rathi, and Tatsuya Suda, "ADAPTIVE: A Prototyping Environment for Transport Systems." *Proceedings of the 4th International Workshop on Computer Aided Modeling, Analysis, and Design of Communication Links and Networks (CAMAD)*, IEEE, Montreal, Canada, September, 1992.
- W3 Donald F. Box, Douglas C. Schmidt, and Tatsuya Suda, "Alternative Approaches to ATM/-Internet Interoperation," *Proceedings of the 1st Workshop on the Architecture and Implementation of High-Performance Communication Subsystems*, IEEE, Tucson, Arizona, February 17-19, 1992, pp. 1-5.

W2 Douglas C. Schmidt and Richard Selby "Modeling Software Interconnectivity," *Proceedings of the 22nd Symposium on the Interface: Computer Science and Statistics*, East Lansing, MI, May, 1990.

W1 Richard W. Selby, Greg James, Kent Madsen, Joan Mahoney, Adam A. Porter, and Douglas C. Schmidt "Classification Tree Analysis Using the Amadeus Measurement and Empirical Analysis System," *Proceedings of the 14th Annual Software Engineering Workshop at NASA Software Engineering Laboratory*, College Park, Maryland, November, 1989, pp. 239-250.

#### • Trade Magazine and Newsletter/Blog Publications

M166 Anita Carleton, James Ivers, Ipek Ozkaya, John E. Robert, Douglas C. Schmidt, and Shen Zhang, "Perspectives on Generative AI in Software Engineering and Acquisition," SEI Blog, February 27th, 2025.

M165 Ipek Ozkaya, Douglas C. Schmidt, and Michael Hilton, "Generative AI and Software Engineering Education," SEI Blog, September 9th, 2024.

M164 John Robert and Douglas C. Schmidt, "Applying Large Language Models to DoD Software Acquisition: An Initial Experiment," SEI Blog, April 1st, 2024.

M163 John Robert and Douglas C. Schmidt, "10 Benefits and 10 Challenges of Applying Large Language Models to DoD Software Acquisition," SEI Blog, January 22nd, 2024.

M162 Douglas C. Schmidt, "The Latest Work from the SEI," January 15th, 2024.

M161 Douglas C. Schmidt, "The Top 10 Blog Posts of 2023," SEI Blog, January 8th, 2024.

M160 , Douglas C. Schmidt and John Robert, "Applying Generative AI to Software Engineering: Navigating Ethical and Educational Landscapes," SEI Blog, December 11th, 2023.

M159 , John Robert and Douglas C. Schmidt, "Generative AI Q&A: Applications in Software Engineering," SEI Blog, November 16th, 2023.

M158 Ipek Ozkaya, Anita Carleton, John E. Robert, and Douglas C. Schmidt, "Application of Large Language Models (LLMs) in Software Engineering: Overblown Hype or Disruptive Change?" SEI Blog, October 2nd, 2023.

M157 Douglas C. Schmidt, "The Latest Work from the SEI: Rust, DevSecOps, AI, and Penetration Testing," SEI Blog, July 5th, 2023.

M156 Anita Carleton, John Robert, Mark Klein, Douglas C. Schmidt, and Erin Harper, "Join the SEI and White House OSTP to Explore the Future of Software and AI Engineering," SEI Blog, May 23rd, 2023.

M155 Douglas C. Schmidt, "The Latest Work from the SEI: Digital Engineering, AI, and Deepfakes", SEI Blog, September 5th, 2022.

M154 Douglas C. Schmidt, "The Latest Work from the SEI: The SEI Year in Review, Explainable AI, and Digital Engineering Effectiveness", SEI Blog, July 4th, 2022.

M153 Douglas C. Schmidt, "The Latest Work from the SEI: The Future of Software Engineering, Ethical AI, Cloud Adoption, and Machine Learning", SEI Blog, February 28th, 2022.

M152 Douglas C. Schmidt and Nickolas Guertin, "Six Acquisition Pathways for Large-Scale, Complex Systems", SEI Blog, February 7th, 2022.

M151 Douglas C. Schmidt, "Top 10 Blog Posts of 2021", SEI Blog, January 10th, 2022.

M150 Douglas C. Schmidt and Nicholas Guertin, "Toward Technical Reference Frameworks to Support Large-Scale Systems of Systems," SEI Blog, December 20th, 2021.

M149 Thomas Evans, Michael Gagliardi, Joseph Kostial, Nicholas Reimer, and Douglas C. Schmidt, "Technical Issues in Navigating the Transition from Sustainment to Engineering Software-Reliant Systems," SEI Blog, December 6th, 2021.

M148 Douglas C. Schmidt, "The Latest Work from the SEI: Coordinated Vulnerability Disclosure, Cybersecurity Research, Cyber Risk and Resilience, and the Importance of Fostering Diversity in Software Engineering," SEI Blog, September 6th, 2021.

M147 Thomas Evans, Michael Gagliardi, Joseph Kostial, Nicholas Reimer, and Douglas C. Schmidt,

- “Navigating People Concerns when Transitioning from Sustainment to Engineering Software-Reliant Systems,” SEI Blog, August 18th, 2021.
- M146 Anita Carleton, John Robert, Mark Klein, Doug Schmidt, Forrest Shull, John Foreman, Ipek Ozkaya, Robert Cunningham, Charlie Holland, Erin Harper, and Edward Desautels, “Architecting the Future of Software Engineering: A Research and Development Roadmap”, SEI Blog, July 12, 2021.
- M145 Douglas C. Schmidt, “The Latest Work from the SEI: Artificial Intelligence, DevSecOps, and Security Incident Response,” SEI Blog, July 5th, 2021.
- M144 Tom Evans, Mike Gagliardi, Joe Kostial, Nicholas Reimer, and Douglas C. Schmidt, “Process Concerns When Navigating the Transition from Sustainment to Engineering Software-Reliant Systems,” SEI Blog, June 14th, 2021.
- M143 Douglas C. Schmidt, “The Latest Work from the SEI: Privacy, Ransomware, Digital Engineering, and the Solar Winds Hack,” SEI Blog, April 5th, 2021.
- M142 Douglas C. Schmidt, “Top 10 Blog Posts of 2020,” SEI Blog, January 11th, 2021.
- M141 Tom Evans, Mike Gagliardi, Joe Kostial, Nicholas Reimer, and Douglas C. Schmidt, “Shifting from Software Sustainment to Software Engineering in the DoD,” SEI Blog, November 30th, 2020.
- M140 Douglas C. Schmidt, “The Latest Work from the SEI: Microservices, Ransomware, and Agile in Government,” SEI Blog, September 7th, 2020.
- M139 Douglas C. Schmidt, “The Latest Work from the SEI: DevSecOps, Artificial Intelligence, and Cybersecurity Maturity Model Certification,” SEI Blog, May 25th, 2020.
- M138 Douglas C. Schmidt, “The Latest Work from the SEI: Penetration Testing, Artificial Intelligence, and Incident Management,” SEI Blog, January 20th, 2020.
- M137 Douglas C. Schmidt, “Top 10 Blog Posts of 2019,” SEI Blog, January 6th, 2020.
- M136 Douglas C. Schmidt, “The Latest Work from the SEI: Microservices, Ransomware, and Agile in Government”, SEI Blog, September 7th, 2019.
- M135 Douglas C. Schmidt, “The Latest Work from the SEI: DevSecOps, Artificial Intelligence, and Cybersecurity Maturity Model Certification”, SEI Blog, May 25th, 2020.
- M134 Douglas C. Schmidt, “The Latest Work from the SEI: Penetration Testing, Artificial Intelligence, and Incident Management”, SEI Blog, January 20th, 2019.
- M133 Douglas C. Schmidt, “The Top 10 Blog Posts of 2019, SEI Blog, January 6th, 2020.
- M132 Nick Guertin, Douglas C. Schmidt, and William Scherlis, “Impacts and Recommendations for Achieving Modular Open Systems Architectures, SEI Blog, September 23rd, 2019.
- M131 Douglas C. Schmidt, “The Latest Work from the SEI: AI, Deepfakes, Automated Alert Handling, and Cyber Intelligence,” SEI Blog, September 2nd, 2019.
- M130 Douglas C. Schmidt, “The Latest Research from the SEI in DevSecOps, Threat Modeling, and Insider Threat,” SEI Blog, May 28th, 2019.
- M129 Douglas C. Schmidt, “Deep Learning, Agile-DevOps, and Cloud Security: The Top 10 Blog Posts of 2018,” SEI Blog, January 7th, 2019.
- M128 Nick Guertin, Douglas C. Schmidt, and William Scherlis, “The Technical Architecture for Product Line Acquisition in the DoD,” SEI Blog, May 6th, 2019.
- M127 Nick Guertin, Douglas C. Schmidt, and William Scherlis, “The Organizational Impact of a Modular Product Line Architecture in DoD Acquisition,” SEI Blog, April 29th, 2019.
- M126 Nick Guertin, Douglas C. Schmidt, and William Scherlis, “Towards a New Model of Acquisition: Product-Line Architectures for the DoD,” SEI Blog, March 11th, 2019.
- M125 Douglas C. Schmidt, “Deep Learning, Agile-DevOps, and Cloud Security: The Top 10 Blog Posts of 2018,” SEI Blog, January 7th, 2019.
- M124 Nick Guertin, Douglas C. Schmidt, and William Scherlis, “Emerging Opportunities in Modularity and Open Systems Architectures,” SEI Blog, October 15th, 2018.

- M123 Douglas C. Schmidt, "Learning, Cyber Intelligence, Managing Privacy and Security, and Network Traffic Analysis: The Latest Work from the SEI," SEI Blog, July 2, 2018.
- M122 Douglas C. Schmidt, "Virtual Integration, Blockchain Programming, and Agile/DevOps: The Latest Work from the SEI," SEI Blog, May 28, 2018.
- M121 Douglas C. Schmidt, "Fighting Chance: Arming the Analyst in the Age of Big Data," SEI Blog, March 26, 2018.
- M120 Douglas C. Schmidt, "Agile/DevOps, Best Practices in Insider Threat, and Dynamic Design Analysis: The Latest Work from the SEI," SEI Blog, February 26, 2018.
- M119 Douglas C. Schmidt, "Bitcoin, Blockchain, Machine Learning, and Ransomware: The Top 10 Posts of 2017," SEI Blog, January 8, 2018.
- M118 Douglas C. Schmidt, "Cyber Warfare, Technical Debt, Network Border Protection, and Insider Threat: The Latest Work from the SEI," SEI Blog, November 27, 2017.
- M117 Douglas C. Schmidt, "Coordinated Vulnerability Disclosure, Ransomware, Scaling Agile, and Android App Analysis: The Latest Work from the SEI, SEI Blog, " September 5, 2017.
- M116 Douglas C. Schmidt, "Top 10 SEI Blog Posts of 2017," SEI Blog, July 10, 2017.
- M115 Douglas C. Schmidt, "Supply Chain Risk Management, Network Situational Awareness, Software Architecture, and Network Time Protocol: The Latest Work from the SEI," SEI Blog, July 3, 2017.
- M114 Douglas C. Schmidt, "Software Assurance, Data Governance, and Malware Analysis: The Latest Work from the SEI," SEI Blog, April 10, 2017.
- M113 Douglas C. Schmidt, "Preventing DDoS Attacks, Scaling Agile, Insider Threat, and Software Architecture: The Latest Work from the SEI," SEI Blog, January 30th, 2017.
- M112 Douglas C. Schmidt, "Autonomy, Robotics, Verification, DDoS Attacks, and Software Testing: The Top 10 Posts of 2016," SEI Blog, December 19th, 2016.
- M111 Douglas C. Schmidt, "Cybersecurity Engineering, Performance, Risk, and Secure Coding: The Latest Work from the SEI," SEI Blog, November 28th, 2016.
- M110 Douglas C. Schmidt, "Resilience, Secure Coding, Data Science, Insider Threat, and Scheduling: The Latest Research from the SEI," SEI Blog, October 17th, 2016.
- M109 Douglas C. Schmidt, "Data Science, Blacklists, and Mixed-Critical Software: The Latest Research from the SEI," SEI Blog, September 5th, 2016.
- M108 Douglas C. Schmidt and Carol Sledge, "A Naval Perspective on Open Systems Architecture," SEI Blog, July 11th, 2016.
- M107 Douglas C. Schmidt, "Top 10 SEI Blog Posts of 2016," SEI Blog, July 4th, 2016.
- M106 Douglas C. Schmidt, "Top 10 SEI Blog Posts of 2016, SEI Blog, July 4th, 2016. Douglas C. Schmidt, Situational Analysis, Software Architecture, Insider Threat, Threat Modeling, and Honeynets: The Latest Research from the SEI," SEI Blog, May 30th, 2016.
- M105 Douglas C. Schmidt, "Threat Analysis Mapping, Connected Vehicles, Emerging Technologies, and Cyber-Foraging: The Latest Research from the SEI," SEI Blog, May 2nd, 2016.
- M104 Douglas C. Schmidt, "The Top 10 Blog Posts of 2015: Technical Debt, DevOps, Graph Analytics, Secure Coding, and Testing," January 4th, 2016.
- M103 Carol Sledge and Douglas C. Schmidt, "A Discussion on Open-Systems Architecture," SEI Blog November 23rd, 2015.
- M102 Douglas C. Schmidt, "Agile, Architecture Fault Analysis, the BIS Wassenaar Rule, and Computer Network Design," SEI Blog, September 7, 2015.
- M101 Douglas C. Schmidt, "Testing, Agile Metrics, Fuzzy Hashing, Android, and Big Data" SEI Blog, July 13, 2015.
- M100 Douglas C. Schmidt, "Resilience, Model-Driven Engineering, Software Quality, and Android App Analysis," SEI Blog, May 18, 2015.
- M99 Douglas C. Schmidt, "Resilience, Metrics, Sustainment, and Software Assurance," SEI Blog, Feb-

bruary 23, 2015.

- M98 Douglas C. Schmidt, "Software Assurance, Social Networking Tools, Insider Threat, and Risk Analysis," SEI Blog, January 19th 2015.
- M97 Douglas C. Schmidt, "The 2014 Year in Review," SEI Blog, December 22nd, 2014.
- M96 Douglas C. Schmidt, Android, Heartbleed, Testing, and DevOps: An SEI Blog Mid-Year Review, SEI Blog, June 30th, 2014.
- M95 Douglas C. Schmidt, "The Importance of Automated Testing in Open Systems Architecture Initiatives," SEI Blog, March 23rd, 2014.
- M94 Douglas C. Schmidt, Accelerating the Industrial Internet with the OMG Data Distribution Service, Real-time Innovations, January 2014.
- M93 Douglas C. Schmidt, "The SEI Blog: the Research Year in Review," SEI Blog, December 23rd, 2013.
- M92 Douglas C. Schmidt "The Architectural Evolution of DoD Combat Systems," SEI Blog, November 25th, 2013.
- M91 Douglas C. Schmidt, "Three Qs: Vanderbilt Professor Douglas Schmidt," GE's Industrial Internet blog, September 10th, 2013.
- M90 Douglas C. Schmidt, "Towards Affordable DoD Combat Systems in the Age of Sequestration," SEI Blog, September 9th, 2013.
- M89 Douglas C. Schmidt, The SEI Blog: A Two-year Retrospective, SEI Blog, April 1st, 2013.
- M88 Douglas C. Schmidt, 2012: "The Research Year in Review," SEI Blog, December 24th, 2012.
- M87 Douglas C. Schmidt, "Reflections on 20 Years of Architecture for Distributed Real-time and Embedded Systems by Douglas C. Schmidt," SEI Blog, October 29th, 2012.
- M86 Douglas C. Schmidt, "Applying Agility to DoD Common Operating Platform Environment Initiatives," SEI Blog, July 30th, 2012.
- M85 Douglas C. Schmidt, "Balancing Agility and Discipline at Scale," SEI Blog, July 23rd, 2012.
- M84 Douglas C. Schmidt, "Strategic Management of Architectural Technical Debt," SEI Blog, July 16th, 2012.
- M83 Douglas C. Schmidt, "Agile Methods: Tools, Techniques, and Practices for the DoD Community," SEI Blog, July 9th, 2012.
- M82 Douglas C. Schmidt, "Applying Agile at-Scale for Mission-Critical Software-Reliant Systems," SEI Blog, July 2nd, 2012.
- M81 Douglas C. Schmidt, "Toward Common Operating Platform Environments, Part 2: Understanding Success Drivers," SEI Blog, May 7th, 2012.
- M80 Douglas C. Schmidt, "Toward Common Operating Platform Environments, Part 1: Doing More for Less," SEI Blog, April 30th, 2012.
- M79 Douglas C. Schmidt, "The Road Ahead for SEI R&D in 2012," SEI Blog, December 26th, 2011.
- M78 Douglas C. Schmidt, "A Summary of Key SEI R&D Accomplishments in 2011," SEI Blog, December 19th, 2011.
- M77 Douglas C. Schmidt, "Bridging the Valley of Disappointment for DoD Software Research with SPRUCE," SEI Blog, November 7th, 2011.
- M76 Douglas C. Schmidt, "The Growing Importance of Software Sustainment for the DoD, Part 2: SEI R&D Activities Related to Sustaining Software for the DoD", SEI Blog, August 15th, 2011.
- M75 Douglas C. Schmidt, "The Growing Importance of Software Sustainment for the DoD, Part 1: Current Trends and Challenges", SEI Blog, August 1st, 2011.
- M74 Douglas C. Schmidt, "New and Upcoming SEI Research Initiatives," SEI Blog, February 21st, 2011.
- M73 Douglas C. Schmidt, "Advancing the Scope and Impact of SEI Research," SEI Blog, February 9th,

2011.

- M72 Douglas C. Schmidt and Ron Guida, "Elastic Application Platforms for Cloud Computing," HPC In the Cloud, September 2010.
- M71 Douglas C. Schmidt and Ron Guida, "Achieving Ultra High Performance in the Cloud," HPC In the Cloud, August 2010.
- M70 Douglas C. Schmidt, "Building Ultra High-Performance Computing Applications with Zircon Software," Programmer's Paradise, May 31st, 2010.
- M69 Egon Wuchner, Andrey Nechypurenko, Jules White, and Douglas C. Schmidt, "Das Generic Eclipse Modeling System (GEMS): Skalierbare Domänenmodellierung Leicht(er) Gemacht," SIGS ObjectSpektrum, June, 2007.
- M68 Jules White, Douglas C. Schmidt, Andrey Nechypurenko, and Egon Wuchner, Introduction to the Generic Eclipse Modeling System, Eclipse Magazine, Volume 06, January, 2007.
- M67 Bala Natarajan, Douglas C. Schmidt, and Steve Vinoski, "Object Interconnections: The CORBA Component Model Part 4: Implementing Components with CCM," C/C++ Users Journal, October, 2004.
- M66 Bala Natarajan, Douglas C. Schmidt, and Steve Vinoski, "The CORBA Component Model Part 3: The CCM Container Architecture and Component Implementation Framework," C/C++ Users Journal, September, 2004.
- M65 Douglas C. Schmidt, Richard Schantz, Aniruddha Gokhale, and Joe Loyall, "Middleware R&D Challenges for Distributed Real-time and Embedded Systems," SIGBED Review, Volume 1, No. 1, April 2004.
- M64 Douglas C. Schmidt and Steve Vinoski, "Object Interconnections: The CORBA Component Model: Part 2: Defining Components with the IDL 3.x Types," C/C++ Users Journal, May, 2004.
- M63 Douglas C. Schmidt and Steve Vinoski, "Object Interconnections: The CORBA Component Model: Part 1: Evolving Towards Components," C/C++ Users Journal, February, 2004.
- M62 Douglas C. Schmidt and Steve Vinoski, "Object Interconnections: XML Reflection for CORBA," C/C++ Users Journal, December, 2003.
- M61 Douglas C. Schmidt and Steve Vinoski, "Object Interconnections: CORBA Metaprogramming Mechanisms, Part 1: Portable Interceptors Concepts and Components," C/C++ Users Journal, March, 2003.
- M60 Douglas C. Schmidt and Steve Vinoski, Object Interconnections: "Dynamic CORBA, Part 4: The Interface Repository," C/C++ Users Journal, January, 2003.
- M59 Douglas C. Schmidt, "Voice of the Customer: An Interview," Raytheon Technology Today, spring 2003, Volume 2, Issue 1.
- M58 Douglas C. Schmidt and Steve Vinoski, "Object Interconnections: Dynamic CORBA, Part 3: The Dynamic Skeleton Interface," C/C++ Users Journal, November, 2002.
- M57 Douglas C. Schmidt and Steve Vinoski, "Object Interconnections: Dynamic CORBA, Part 2: Dynamic Any," C/C++ Users Journal, September, 2002.
- M56 Douglas C. Schmidt and Steve Vinoski, "Object Interconnections: Dynamic CORBA, Part 1: The Dynamic Invocation Interface," C/C++ Users Journal, July, 2002.
- M55 Douglas C. Schmidt and Steve Vinoski, "Object Interconnections: Real-time CORBA, Part 4: Protocol Selection and Explicit Binding," C/C++ Users Journal, May, 2002.
- M54 Douglas C. Schmidt and Steve Huston, "Why Standards Alone Won't Get You Portable Software And How to Make Open-Source Development Work for You," InformIT: Focus on C++, Addison-Wesley.
- M53 Douglas C. Schmidt and Steve Vinoski, "Real-time CORBA Part 3: Thread Pools and Synchronizers," C/C++ Users Journal, March, 2002.
- M52 Douglas C. Schmidt and Steve Vinoski, "Real-time CORBA, Part 2: Applications and Priorities," C/C++ Users Journal, January, 2002.
- M51 Douglas C. Schmidt and Steve Vinoski, "Real-time CORBA, Part 1: Motivation and Overview,"

- C/C++ Users Journal*, October, 2001.
- M50 Douglas C. Schmidt and Steve Vinoski, "CORBA and XML, Part 3: SOAP and Web Services," *C/C++ Users Journal*, September, 2001.
- M48 Douglas C. Schmidt and Steve Vinoski, "Object Interconnections: CORBA and XML, Part 2: XML as CORBA Data," *C/C++ Users Journal*, July, 2001.
- M47 Douglas C. Schmidt and Steve Vinoski, "Object Interconnections: CORBA and XML, Part 1: Versioning," *C/C++ Users Journal*, May, 2001.
- M46 Douglas C. Schmidt and Steve Vinoski, "Standard C++ and the OMG C++ Mapping: Server-side Mappings and Pseudo-Objects," *C/C++ Users Journal*, April, 2001.
- M45 Douglas C. Schmidt and Steve Vinoski, "Standard C++ and the OMG C++ Mapping," *C/C++ Users Journal*, January, 2001.
- M44 Douglas C. Schmidt and Steve Vinoski, "The History of the OMG C++ Mapping", *C/C++ Users Journal*, November, 2000.
- M43 Douglas C. Schmidt and Steve Vinoski, "An Overview of the OMG CORBA Messaging Quality of Service (QoS) Framework," *C++ Report*, SIGS, Vol. 12, No 3, March, 2000.
- M42 Douglas C. Schmidt, "Monitor Object – an Object Behavior Pattern for Concurrent Programming," *C++ Report*, SIGS, Vol. 12., No. 4. May 2000.
- M41 Alexander B. Arulanthu, Carlos O’Ryan, Douglas C. Schmidt, and Michael Kircher, "Applying Patterns and Components to Develop an IDL Compiler for CORBA AMI Callbacks," *C++ Report*, SIGS, Vol. 12, No. 3, March, 2000.
- M40 David Levine, Chris Gill, and Douglas C. Schmidt, "Object Lifetime Manager – A Complementary Pattern for Controlling Object Creation and Destruction," *C++ Report*, SIGS, Vol. 11, No. 11, November/December, 1999.
- M39 Douglas C. Schmidt, Steve Vinoski, and Nanbor Wang, "Collocation Optimizations for CORBA," *C++ Report*, SIGS, Vol. 11, No. 10, October, 1999.
- M38 Douglas C. Schmidt, "Strategized Locking, Thread-safe Decorator, and Scoped Locking: Patterns and Idioms for Simplifying Multi-threaded C++ Components," *C++ Report*, SIGS, Vol. 11, No. 9, September, 1999.
- M37 Douglas C. Schmidt and Steve Vinoski, "Time-Independent Invocation and Interoperable Routing," *C++ Report*, SIGS, Vol. 11, No 5, May, 1999.
- M36 Michael Kircher and Douglas C. Schmidt, "Dove: A Distributed Object Visualization Environment," *C++ Report*, SIGS, Vol. 11, No 3, March, 1999.
- M35 Douglas C. Schmidt, "Wrapper Facade: A Structural Pattern for Encapsulating Functions within Classes," *C++ Report*, SIGS, Vol. 11, No 2, February, 1999.
- M34 Douglas C. Schmidt and Steve Vinoski, "Programming Asynchronous Method Invocation with CORBA Messaging," *C++ Report*, SIGS, Vol. 11, No 2, February, 1999.
- M33 Douglas C. Schmidt "Why Software Reuse has Failed and How to Make It Work for You," *C++ Report*, SIGS, Vol. 11, No. 1, January, 1999.
- M32 Douglas C. Schmidt, "An Architectural Overview of the ACE Framework: A Case-study of Successful Cross-platform Systems Software Reuse," *USENIX login magazine*, Tools special issue, November, 1998.
- M31 Douglas C. Schmidt, "GPERF: A Perfect Hash Function Generator," *C++ Report*, SIGS, Vol. 10, No. 10, November/December, 1998.
- M30 Douglas C. Schmidt and Steve Vinoski, "Introduction to CORBA Messaging," *SIGS*, Vol. 10, No 10, November/December, 1998.
- M29 Douglas C. Schmidt and Steve Vinoski, "C++ Servant Managers for the Portable Object Adapter," *SIGS*, Vol. 10, No 8, September, 1998.
- M28 Chris Cleeland and Douglas C. Schmidt, "External Polymorphism, An Object Structural Pat-

- tern for Transparently Extending C++ Concrete Data Types," *C++ Report*, SIGS, Vol. 10, No. 6, July/August, 1998.
- M27 Douglas C. Schmidt and Irfan Pyarali, "Strategies for Implementing POSIX Condition Variables on Win32," *C++ Report*, SIGS, Vol. 10, No. 5, June, 1998.
- M26 Douglas C. Schmidt and Steve Vinoski, "Using the Portable Object Adapter for Transient and Persistent CORBA Objects," *C++ Report*, SIGS, Vol. 10, No 4. May, 1998.
- M25 Douglas C. Schmidt, "Applying Design Patterns to Simplify Signal Handling," *C++ Report*, SIGS, Vol. 10, No. 4, May, 1998.
- M24 Douglas C. Schmidt, Tim H. Harrison, and Nat Pryce, "Thread-specific Storage: an Object Behavioral Pattern for Efficiently Accessing per-Thread State," *C++ Report*, SIGS, Vol. 9, No. 10, November/December, 1997
- M23 Douglas C. Schmidt and Steve Vinoski, "Object Adapters: Concepts and Terminology," *C++ Report*, SIGS, Vol. 9, No 11. November/December, 1997.
- M22 Prashant Jain and Douglas C. Schmidt, "Dynamically Configuring Communication Services with the Service Configurator Pattern," *C++ Report*, SIGS, Vol. 9, No. 6, June, 1997.
- M21 Douglas C. Schmidt and Steve Vinoski, "Overcoming Drawbacks in the OMG Events Service," *C++ Report*, SIGS, Vol. 9, No 6. June, 1997.
- M20 Douglas C. Schmidt and Steve Vinoski, "OMG Event Object Service," *C++ Report*, SIGS, Vol. 9, No 2. February, 1997.
- M19 Prashant Jain and Douglas C. Schmidt, "Experiences Converting a C++ Communication Framework to Java," *C++ Report*, SIGS, Vol. 9, No. 1, January, 1997.
- M18 Douglas C. Schmidt, "Lessons Learned Building Reusable OO Telecommunication Software," *Multiuse Express*, Lucent Technologies, Vol. 4, No. 6, December, 1996.
- M17 Douglas C. Schmidt and Steve Vinoski, "Distributed Callbacks and Decoupled Communication in CORBA," *C++ Report*, SIGS, Vol. 8, No 9. October, 1996.
- M16 Timothy H. Harrison and Douglas C. Schmidt, "Evaluating the Performance of OO Network Programming Toolkits," *C++ Report*, SIGS, Vol. 8, No 7. July/August 1996.
- M15 Douglas C. Schmidt and Steve Vinoski, "Comparing Alternative Programming Techniques for Multi-threaded Servers – the Thread-per-Session Concurrency Model," *C++ Report*, SIGS, Vol. 8, No 7. July/August 1996.
- M14 Douglas C. Schmidt and Steve Vinoski, "Comparing Alternative Programming Techniques for Multi-threaded Servers – the Thread-Pool Concurrency Model," *C++ Report*, SIGS, Vol. 8, No 4. April 1996.
- M13 Douglas C. Schmidt and Steve Vinoski, "Comparing Alternative Programming Techniques for Multi-threaded Servers – the Thread-per-Request Concurrency Model," *C++ Report*, SIGS, Vol. 8, No 2. February 1996.
- M12 Douglas C. Schmidt, "A Design Pattern for Actively Initializing Network Services," *C++ Report*, SIGS, Vol. 8, No. 1, January 1996.
- M11 Douglas C. Schmidt, "Design Patterns for Initializing Network Services: Introducing the Acceptor and Connector Patterns," *C++ Report*, SIGS, Vol. 7, No. 9, November/December 1995.
- M10 Douglas C. Schmidt and Steve Vinoski, "Comparing Alternative Server-side Distributed Programming Techniques," *Object Interconnections Column*, *C++ Report*, SIGS, Vol. 7, No. 8, October 1995.
- M9 Douglas C. Schmidt and Steve Vinoski, "Comparing Alternative Client-side Distributed Programming Techniques," *Object Interconnections Column*, *C++ Report*, SIGS, Vol. 7, No. 4, May 1995.
- M8 Douglas C. Schmidt and Paul Stephenson, "Using Design Patterns to Evolve System Software from UNIX to Windows NT," *C++ Report*, SIGS, Vol. 7, No. 3, March/April 1995, pp. 27-39.
- M8 Douglas C. Schmidt and Steve Vinoski, "Distributed Object Computing by Example," *Object In-*

terconnections Column, *C++ Report*, SIGS, Vol. 7, No. 2, February 1995.

- M7 Douglas C. Schmidt and Steve Vinoski, "Distributed Object Computing with C++," Object Interconnections Column, *C++ Report*, SIGS, Vol. 7, No. 1, January 1995.
- M6 Douglas C. Schmidt, "Transparently Parameterizing Synchronization Mechanisms into a Concurrent Distributed Application," *C++ Report*, SIGS, Vol. 6, No. 5, July/August 1994, pp. 1-10.
- M5 Douglas C. Schmidt, "A Domain Analysis of Network Daemon Design Dimensions," *C++ Report*, SIGS, Vol. 6, No. 3, March/April, 1994, pp. 1-12.
- M4 Douglas C. Schmidt, "The Object-Oriented Design and Implementation of the Reactor: A C++ Wrapper for UNIX I/O Multiplexing," *C++ Report*, SIGS, Vol. 5, No. 7, September, 1993, pp. 1-14.
- M3 Douglas C. Schmidt, "The Reactor: An Object-Oriented Interface for Event-Driven UNIX I/O Multiplexing," *C++ Report*, SIGS, Vol. 5, No. 2, February, 1993, pp. 1-12.
- M2 Douglas C. Schmidt, "IPC SAP: An Object-Oriented Interface to Operating System Inter-process Communication Services," *C++ Report*, SIGS, Vol. 4, No. 8, November/December, 1992, pp. 1-10.
- M1 Douglas C. Schmidt, "Systems Programming with C++ Wrappers: Encapsulating Interprocess Communication Services with Object-Oriented Interfaces," *C++ Report*, SIGS, Vol. 4, No. 7, September/October, 1992, pp 1-6.

#### • Editorials and Book Forewords

- E32 Douglas C. Schmidt and Jules White, "Why Don't Big Companies Keep Their Computer Systems Up-to-date?," *The Conversation*, September 26, 2017.
- E31 Douglas C. Schmidt, "How Vanderbilt's Secret Software Lab Is Saving America," *gizmodo.com*, January 10th, 2014.
- E31 Douglas C. Schmidt, "Ten Tech Terms Everyone Needs to Know for 2014," *Yahoo Tech News*, August 12, 2013.
- E30 Douglas C. Schmidt and Philippe Fauchet, "Students Must Stay to Better Workforce," *The Tennessean*, August 6th, 2013.
- E29 Douglas C. Schmidt, "Learning in MOOC Years," *Vanderbilt Magazine*, Spring 2013.
- E28 Douglas C. Schmidt, Foreword to the book *Patterns of Parallel Software Design*, by Jorge Luis Ortega Arjona, Wiley, 2010.
- E27 Douglas C. Schmidt, Foreword to the book *Practical Software Factories in .NET* by Gunther Lenz and Christoph Wienands, Apress, 2006.
- E26 Douglas C. Schmidt, Guest editorial of the IEEE Computer Special Issue on Model Driven Development, February 2006.
- E25 Douglas C. Schmidt, Guest editorial for IEEE Networks magazine Special Issue on Middleware Technologies for Future Communication Networks, January 2004.
- E24 Douglas C. Schmidt, Foreword to the book *Fundamentals of Distributed Object Systems: The CORBA Perspective*, by Zahir Tari and Omran Bukhres, Wiley and Sons, 2001.
- E23 Douglas C. Schmidt, Foreword to the book *Design Patterns in Communication Software*, edited by Linda Rising and published by Cambridge University Press, 2000.
- E22 Douglas C. Schmidt, "Trends in Distributed Object Computing" editorial for the special issue on Distributed Object-Oriented Systems appearing in the *Parallel and Distributed Computing Practices* journal, edited by Maria Cobb and Kevine Shaw, Vol. 3, No. 1, March 2000.
- E21 Douglas C. Schmidt, "Object-Oriented Application Frameworks," guest editorial for the *Communications of the ACM*, Special Issue on Object-Oriented Application Frameworks, Vol. 40, No. 10, October 1997.
- E20 Douglas C. Schmidt, "Recent Advances in Distributed Object Computing," guest editorial for the *IEEE Communications Magazine* feature topic issue on Distributed Object Computing, Vol. 14, No. 2, February, 1997.

- E19 Douglas C. Schmidt, Guest editorial for the USENIX Computing Systems Special Issue on Distributed Object Computing Vol. 9, No. 4, November/December, 1996.
- E18 Douglas C. Schmidt, "Software Patterns," guest editorial for Communications of the ACM, Special Issue on Patterns and Pattern Languages, Vol. 39, No. 10, October 1996.
- E17 Douglas C. Schmidt, "Using Design Patterns to Develop Reuseable Object-Oriented Software," Strategic Directions in Computing Research OO Working Group conference, MIT, June 14-15, 1996.
- E16 Douglas C. Schmidt, "The Last Waltz," C++ Report, SIGS, Vol. 11, No. 4, April 1999.
- E15 Douglas C. Schmidt, "Patterns++ - the Next Generation," C++ Report, SIGS, Vol. 9, No. 4, April 1997.
- E14 Douglas C. Schmidt, "CORBA: CASE for the late '90s?" C++ Report, SIGS, Vol. 9, No. 2, February 1997.
- E13 Douglas C. Schmidt, "Java: Friend or Foe," C++ Report, SIGS, Vol. 9, No. 1, January 1997.
- E12 Douglas C. Schmidt, "Promise Keepers," C++ Report, SIGS, Vol. 8, No. 11, November/December 1996.
- E11 Douglas C. Schmidt, "The Programming Principle," C++ Report, SIGS, Vol. 8, No. 10, October 1996.
- E10 Douglas C. Schmidt, "Pattern Forces," C++ Report, SIGS, Vol. 8, No. 9, September 1996.
- E9 Douglas C. Schmidt, "The Secrets of Success for C++," C++ Report, SIGS, Vol. 8, No. 9, August 1996.
- E8 Douglas C. Schmidt, "The C++ Decade," C++ Report, SIGS, Vol. 8, No. 9, August 1996.
- E7 Douglas C. Schmidt, "Addressing the Challenge of Concurrent and Distributed Systems," C++ Report, SIGS, Vol. 8, No. 7, July 1996.
- E6 Douglas C. Schmidt, "Delivering the Goods," C++ Report, SIGS, Vol. 8, No. 6, June 1996.
- E5 Douglas C. Schmidt, "Problems with Process," C++ Report, SIGS, Vol. 8, No. 5, May 1996.
- E4 Douglas C. Schmidt, "The Impact of Social Forces on Software Project Failures," C++ Report, SIGS, Vol. 8, No. 4, April 1996.
- E3 Douglas C. Schmidt, "Reality Check," C++ Report, SIGS, Vol. 8, No. 3, March 1996.
- E2 Douglas C. Schmidt, "Role Models for Success," C++ Report, SIGS, Vol. 8, No. 2, February 1996.
- E1 Douglas C. Schmidt, "A Zest for Programming," C++ Report, SIGS, Vol. 8, No. 1, January 1996.

- **Refereed Short Papers, Posters, and Demos**

- P14 Maria Powell, Marcelino Rodriguez Cancio, David Young, William Nock, Beshoy Abdelmessih, Amy Zeller, Irvin Perez Morales, Peng Zhang, C. Gaelyn Garrett, Douglas Schmidt, Jules White, and Alexander Gelbard, "Decoding Phonation with Artificial Intelligence: Proof of Concept," Poster Proceedings in the 13th International Conference on Advances in Quantitative Laryngology, Voice and Speech Research, Montreal, Canada, June 2-4th, 2019.
- P13 Akram Hakiri, Berthou Pascal, Gayraud Thierry, Aniruddha Gokhale, Joe Hoffert, and Douglas C. Schmidt, "SIP-based QoS Support and Session Management for DDS-based Distributed Real-time and Embedded Systems," Poster Proceedings of the 5th ACM International Conference on Distributed Event-based Systems (DEBS'11), New York City, NY, USA, July 11-15, 2011.
- P12 Jules White, Andrey Nechypurenko, Egon Wuchner, and Douglas C. Schmidt "Automatic Role-based Constraint Solving for Real-Time and Embedded Systems: An Approach to Modeling Guidance", poster paper at the 14th Annual IEEE International Conference and Workshop on the Engineering of Computer Based Systems (ECBS), March 26th-29th, 2007, Tucson, Arizona.
- P11 John Kinnebrew, Nishanth Shankaran, Gautam Biswas, and Douglas Schmidt, "A Decision-

Theoretic Planner with Dynamic Component Reconfiguration for Distributed Real-Time Applications,” Poster paper at the Twenty-First National Conference on Artificial Intelligence, July 16-20, 2006, Boston, Massachusetts.

- P10 Jai Balasubramanian, Nishanth Shankar, Douglas C. Schmidt, Gautam Biswas, Patrick Lardieri, Ed Mulholland, and Tom Damiano, “A Framework for (Re)Deploying Components in Distributed Realtime and Embedded Systems,” poster paper at the Dependable and Adaptive Distributed Systems, Track of the 21st ACM Symposium on Applied Computing, April 23-27, 2006, Bourgogne University, Dijon, France.
- P9 Jules White and Douglas C. Schmidt, Reducing Enterprise Product Line Architecture Deployment Costs via Model-Driven Deployment and Configuration Testing, Poster paper at the 13th Annual IEEE International Conference and Workshop on the Engineering of Computer Based Systems (ECBS '06) March 27th-30th, 2006, University of Potsdam, Potsdam, Germany.
- P8 Arvind S. Krishna, Aniruddha Gokhale, Douglas C. Schmidt, John Hatcliff, and Venkatesh Prasad Ranganat, “Towards Highly Optimized Real-time Middleware for Software Product-line Architectures,” Proceedings of the Work-In-Progress session at the 26th IEEE Real-Time Systems Symposium, December 5-8, 2005, Miami, Florida.
- P7 Gan Deng, Douglas Schmidt, and Aniruddha Gokhale, “Supporting Configuration and Deployment of Component-based DRE Systems Using Frameworks, Models, and Aspects,” Poster Session of the 20th Annual ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages and Applications (OOPSLA 2005), San Diego, CA, October 16-20, 2005.
- P6 Jules White, Douglas Schmidt, and Aniruddha Gokhale, “The J3 Process for Building Autonomous Enterprise Java Bean Systems,” Proceedings of the International Conference on Autonomous Computing (ICAC 2005), Seattle, WA, June 2005 (short paper).
- P5 Aniruddha Gokhale, Arvind Krishna and Douglas C. Schmidt, “CoSMIC: Addressing Cross-cutting Deployment and Configuration Concerns of Distributed Real-time and Embedded Systems via Aspect-oriented and Model-driven Software Development,” Demo Session, Fourth International Conference on Aspect-oriented Software Development (AOSD), Chicago, IL, Mar 2005.
- P4 Aniruddha Gokhale, Krishnakumar Balasubramanian, Jaiganesh Balasubramanian, Arvind Krishna, George Edwards, Gan Deng, Jeff Parsons, Tao Lu, Balachandran Natarajan and Douglas C. Schmidt, “CoSMIC: Addressing Crosscutting Deployment and Configuration Concerns in QoS-sensitive Distributed Systems,” 19th ACM OOPSLA Conference, Poster Session, Vancouver, Canada, Oct 2004.
- P3 Joseph K. Cross and Douglas C. Schmidt, “Meta-Programming Techniques to Declaratively Optimize Middleware Policies and Mechanisms,” Poster session at the IFIP/ACM Middleware 2001 International Conference on Distributed Systems Platforms, Heidelberg, Germany, November 12-16, 2001.
- P2 Aniruddha Gokhale and Douglas C. Schmidt, “Design Principles and Optimizations for High Performance ORBs,” ACM, *OOPSLA 97*, Poster Session, Oct 1997, Atlanta, GA, USA.
- P1 Douglas C. Schmidt, “Performance Experiments on Alternative Methods for Structuring Active Objects in High-Performance Parallel Communication Systems,” 9th ACM OOPSLA Conference, poster paper, Portland, Oregon, October, 1994, pp. 1-12.

#### • Technical Reports

- TR18 Douglas C. Schmidt, “Google Data Collection,” Vanderbilt University Technical Report #ISIS-20-201, August 15, 2018.
- TR17 Gan Deng, Douglas C. Schmidt, Aniruddha Gokhale, “Ensuring Deployment Predictability of Distributed Real-time and Embedded Systems,” Vanderbilt University Technical Report #ISIS-07-814, November 2007.
- TR16 Jaiganesh Balasubramanian, Sumant Tambe, Chenyang Lu, Christopher Gill, Aniruddha Gokhale, and Douglas C. Schmidt, “FLARE: a Fault-tolerant Lightweight Adaptive Real-time Middleware for Distributed Real-time and Embedded, Systems,” Vanderbilt University Technical Report #ISIS-07-812, October 2007.
- TR15 Shanshan Jiang, Yuan Xue, and Douglas Schmidt, “Minimum Disruption Service Composition and Recovery in Mobile Ad hoc Networks,” Vanderbilt University Technical Report #ISIS-

06-711, December 2006.

- TR14 Andrey Nechypurenko, Egon Wuchner, Jules White, Douglas C. Schmidt, "Application of Aspect-based Modeling and Weaving for Complexity Reduction in the Development of Automotive Distributed Real-time Embedded Systems," Vanderbilt University Technical Report #ISIS-06-709, July 2006.
- TR13 James H. Hill, John M. Slaby, Steve Baker, Douglas C. Schmidt, "Predicting the Behavior for Components of the SLICE Scenario," Vanderbilt University Technical Report #ISIS-05-608, October 2005.
- TR12 Stoyan Paunov, James Hill, Douglas C. Schmidt, John Slaby, and Steve Baker, "Domain-Specific Modeling Languages for Configuring and Evaluating Enterprise DRE System Quality of Service," Vanderbilt University Technical Report #ISIS-05-606, August 2005.
- TR11 John M. Slaby, Steve Baker, James Hill, Doug Schmidt, "Applying System Execution Modeling Tools to Evaluate Enterprise Distributed Real-time and Embedded System QoS," Vanderbilt University Technical Report #ISIS-05-604, June 2005.
- TR10 Fred Kuhns and Carlos O'Ryan and Douglas C. Schmidt and Jeff Parsons, "The Design and Performance of a Pluggable Protocols Framework for Object Request Broker Middleware," Washington University Technical Report #WUCS-99-12, St. Louis, MO, Dept. of Computer Science, April 1999.
- TR9 Sumedh Mungee, Nagarajan Surendran, and Douglas C. Schmidt, "The Design and Performance of a CORBA Audio/Video Streaming Service," Washington University Technical Report #WUCS-98-15.
- TR8 Lutz Prechelt, Barbara Unger, Douglas C. Schmidt, "Replication of the First Controlled Experiment on the Usefulness of Design Patterns: Detailed Description and Evaluation." 77 pgs., Washington University Technical Report #wucs-97-34, December 1997.
- TR7 Aniruddha Gokhale and Douglas C. Schmidt, "Optimizing the Performance of the CORBA Internet Inter-ORB Protocol Over ATM," Washington University Technical Report #WUCS- 97-10.
- TR6 James Hu and Sumedh Mungee and Douglas C. Schmidt, "Principles for Developing and Measuring High-performance Web Servers over ATM," Washington University Technical Report #WUCS-97-10.
- TR5 Chris Cleeland, Douglas C. Schmidt, and Tim H. Harrison, "External Polymorphism – An Object Structural Pattern for Transparently Extending Concrete Data Types," The 3rd annual Pattern Languages of Programming conference in Allerton Park, Illinois, September 4-6, 1996, Washington University Technical Report #WUCS-97-07.
- TR4 Timothy H. Harrison, Douglas C. Schmidt, and Irfan Pyarali, "Asynchronous Completion Token," The 3rd annual Pattern Languages of Programming conference in Allerton Park, Illinois, September 4-6, 1996, Washington University Technical Report #WUCS-97-07.
- TR3 Douglas C. Schmidt and Timothy H. Harrison, "The Double-Checked Locking Pattern," The 3rd annual Pattern Languages of Programming conference in Allerton Park, Illinois, September 4-6, 1996, Washington University Technical Report #WUCS-97-07.
- TR2 Prashant Jain and Douglas C. Schmidt, "The Service Configurator Pattern," The 3rd annual Pattern Languages of Programming conference in Allerton Park, Illinois, September 4-6, 1996, Washington University Technical Report #WUCS-97-07.
- TR1 Douglas C. Schmidt, "Acceptor and Connector: Design Patterns for Initializing Network Services," The EuroPLOP '96 conference in Kloster Irsee, Germany, July 10-14, 1996, Washington University Technical Report #WUCS-97-07.

## Presentations

### Conference Presentations

1. "Mobile Applications Technology Overview," Digital Technologies in Cancer Research Workshop, Vanderbilt University, Nashville, TN, May 15th 2019.
2. "Website Applications Technology Overview," Digital Technologies in Cancer Research Workshop, Vanderbilt University, Nashville, TN, May 15th 2019.

3. "Producing and Delivering a Coursera MOOC on Pattern-Oriented Software Architecture for Concurrent and Networked Software," WaveFront forum at the SPLASH 2013 conference, Indianapolis, IN, October 29th, 2013.
4. "Addressing the Challenges of Tactical Information Management in Net-Centric Systems with the OMG Data Distribution Service (DDS)," the 16th International ACM Workshop on Parallel and Distributed Real-Time Systems (WPDRTS '08), Miami, Florida, April 14, 2008.
5. "The Design and Performance of Configurable Component Middleware for End-to-End Adaptation of Distributed Real-time Embedded Systems," proceedings of the 10th IEEE International Symposium on Object/Component/Service-oriented Real-time Distributed Computing (ISORC), May 7-9, 2007, Santorini Island, Greece.
6. "A Decision-Theoretic Planner for DRE Systems," 7th OMG Real-time/Embedded CORBA workshop, Arlington, VA, July 10-13, 2006.
7. "Model-driven QoS Provisioning for Real-time CORBA and CCM DRE Systems," 6th OMG Real-time/Embedded CORBA workshop, Arlington, VA, July 11-14, 2005.
8. "Research Advances in Middleware for Distributed Systems: State of the Art," Computer Communications stream of the 17th IFIP World Computer Congress, Montreal, Canada, August 25-30, 2002.
9. "Towards Highly Configurable Real-time Object Request Brokers," the IEEE International Symposium on Object-Oriented Real-time Distributed Computing (ISORC), Washington DC, April 29 - May 1, 2002.
10. "Operating System Performance in Support of Real-time Middleware," Proceedings of the 7th IEEE Workshop on Object-oriented Real-time Dependable Systems, San Diego, CA, January, 2002.
11. "Designing an Efficient and Scalable Server-side Asynchrony Model for CORBA," Proceedings of the ACM SIGPLAN Workshop on Optimization of Middleware and Distributed Systems (OM 2001), Snowbird, Utah, June 18, 2001.
12. "DOORS: Towards High-performance Fault-Tolerant CORBA," Proceedings of the 2nd International Symposium on Distributed Objects and Applications (DOA '00), OMG, Antwerp, Belgium, September 2000.
13. "The Design and Performance of a CORBA Audio/Video Streaming Service," Proceedings of the 31st Hawaii International Conference on System Systems (HICSS), Hawaii, January, 1999, mini-track on Multimedia DBMS and the WWW, Hawaii, January 1999.
14. "Alleviating Priority Inversion and Non-determinism in Real-time CORBA ORB Core Architectures," Proceedings of the Fourth IEEE Real-Time Technology and Applications Symposium (RTAS), Denver, Colorado, June 3-5, 1998
15. "Optimizing the Performance of the CORBA Internet Inter-ORB Protocol Over ATM," Proceedings of the 31st Hawaii International Conference on System Systems (HICSS), Hawaii, January, 1998. This was selected as the best paper in the Software Technology Track (188 submitted, 77 accepted).
16. "The Double-Checked Locking Pattern," *Proceedings of the 3rd annual Pattern Languages of Programming conference* in Allerton Park, Illinois, September 4-6, 1996.
17. "Acceptor and Connector: Design Patterns for Initializing Network Services," Proceedings of the EuroPLOP '96 conference, Kloster Irsee, Germany, July 10-14, 1996.
18. "Measuring the Performance of Communication Middleware on High-Speed Networks," Proceedings of SIGCOMM '96, ACM, San Francisco, August 28-30th, 1996.
19. "Design and Performance of an Object-Oriented Framework for High-Speed Electronic Medical Imaging," Proceedings of the 2<sup>nd</sup> Conference on Object-Oriented Technologies and Systems (COOTS), USENIX, Toronto, June 18-22, 1996.
20. "A Family of Design Patterns For Flexibly Configuring Network Services in Distributed Systems," Proceedings of the International Conference on Configurable Distributed Systems, IEEE, Annapolis, Maryland, May 6-8, 1996.
21. "Using Design Patterns to Develop High-Performance Object-Oriented Communication Software Frameworks," Proceedings of the 8<sup>th</sup> Annual Software Technology Conference, Salt Lake City, Utah, April 21-26, 1996.

22. "An Object-Oriented Framework for High-Performance Electronic Medical Imaging," Proceedings of the *Very High Resolution and Quality Imaging* mini-conference at the Symposium on Electronic Imaging in the International Symposia Photonics West 1996, SPIE, San Jose, California USA, January 27 - February 2, 1996.
23. "Half-Sync/Half-Async: A Pattern for Efficient and Well-structured Concurrent I/O," *Proceedings of the 2<sup>nd</sup> Pattern Languages of Programs Conference* Monticello, Illinois, September 6-8, 1995.
24. "Acceptor and Connector: Design Patterns for Actively and Passively Initializing Network Services." Workshop on Pattern Languages of Object-Oriented Programs at ECOOP '95, August 7 - 1, 1995, Aarhus, Denmark.
25. "Object-Oriented Components for High-speed Network Programming," *Proceedings of the Conference on Object-Oriented Technologies (COOTS)*, USENIX, June 26-29, 1995 Monterey, California, USA, pp. 21-38.
26. "Experience Using Design Patterns to Evolve Communication Software Across Diverse OS Platforms," *Proceedings of the 9<sup>th</sup> European Conference on Object-Oriented Programming (ECOOP)*, ACM, Aarhus, Denmark, August, 1995.
27. "Measuring the Performance of Parallel Message-based Process Architectures," *Proceedings of the INFOCOM Conference on Computer Communications*, IEEE, Boston, MA, April, 1995, pp. 624- 633.
28. "High-Performance Event Filtering for Dynamic Multi-point Applications," Proceedings of the 1<sup>st</sup> Workshop on High Performance Protocol Architectures (HIPPARCH), INRIA, Sophia Antipolis, France, December, 1994, p 1-8.
29. "Flexible Configuration of High-Performance Object-Oriented Distributed Communication Systems," 9<sup>th</sup> OOPSLA Conference, invited paper to the Workshop on Flexibility in Systems Software, ACM, Portland, Oregon, October, 1994, pp. 1-4.
30. "Performance Experiments on Alternative Methods for Structuring Active Objects in High-Performance Parallel Communication Systems," 9<sup>th</sup> OOPSLA Conference, poster session, ACM, Portland, Oregon, October, 1994, pp. 1-12.
31. "Measuring the Impact of Alternative Parallel Process Architectures on Communication Subsystem Performance," *Proceedings of the Proceedings of the 4<sup>th</sup> International Workshop on Protocols for High-Speed Networks*, IFIP, Vancouver, British Columbia, August, 1994, pp. 103-118.
32. "Reactor: An Object Behavioral Pattern for Concurrent Event Demultiplexing and Dispatching," *Proceedings of the 1<sup>st</sup> Annual Conference on the Pattern Languages of Programs*, Monticello, Illinois, August, 1994, pp. 1-10.
33. "Experiences with an Object-Oriented Architecture for Developing Dynamically Extensible Network Management Software," *Proceedings of the Globecom Conference*, IEEE, San Francisco, California, November, 1994, pp. 1-7.
34. "Configuring Function-based Communication Protocols for Distributed Applications," *Proceedings of the 8<sup>th</sup> International Working Conference on Upper Layer Protocols, Architectures, and Applications*, IFIP, Barcelona, Spain, June 1-3, 1994, pp. 361-376.
35. "The ADAPTIVE Service Executive: An Object-Oriented Architecture for Configuring Concurrent Distributed Communication Systems," *Proceedings of the 8<sup>th</sup> International Working Conference on Upper Layer Protocols, Architectures, and Applications*, IFIP, Barcelona, Spain, June 1-3, 1994, pp. 163-178.
36. "ASX: An Object-Oriented Framework for Developing Distributed Applications," *Proceedings of the 6<sup>th</sup> C++ Conference*, USENIX, Cambridge, Massachusetts, April, 1994, pp. 200-220.
37. "The Service Configurator Framework: An Extensible Architecture for Dynamically Configuring Concurrent, Multi-service Network Daemons," *Proceedings of the 2<sup>nd</sup> International Workshop on Configurable Distributed Systems*, IEEE, Pittsburgh, PA, March 21-23, 1994, pp. 190-201.
38. "Tools for Generating Application-Tailored Multimedia Protocols on Heterogeneous Multi-Processor Platforms," *Proceedings of the 2<sup>nd</sup> Workshop on High-Performance Communications Subsystems*, IEEE, Williamsburg, Virginia, September 1-3, 1993, pp. 1-7.
39. "A Framework for Developing and Experimenting with Parallel Process Architectures to Support High-Performance Transport Systems," *Proceedings of the 2<sup>nd</sup> Workshop on High-Performance*

*Communications Subsystems*, IEEE, Williamsburg, Virginia, September 1-3, 1993, pp. 1–8.

40. "ADAPTIVE: a Framework for Experimenting with High-Performance Transport System Process Architectures," *Proceedings of the 2<sup>nd</sup> International Conference on Computer Communications and Networks*, ISCA, San Diego, California, June 28-30, 1993, pp. 1–8.
41. "ADAPTIVE: A Flexible and Adaptive Transport System Architecture to Support Lightweight Protocols for Multimedia Applications on High-Speed Networks," *Proceedings of the 1<sup>st</sup> Symposium on High Performance Distributed Computing*, IEEE, Syracuse, New York, September 9-11, 1992, pp. 174–186.
42. "GPERF: A Perfect Hash Function Generator," *Proceedings of the 2<sup>nd</sup> C++ Conference*, USENIX, San Francisco, California, April 9-11, 1990, pp. 87–102.

### Congressional Testimony

1. Testified before the United States House Armed Services Committee on DOT&E oversight of Tactical Air and Land Combat Systems, April 16th, 2024.
2. Testified before the United States Senate Armed Services Committee at my confirmation hearing for the position of Director of Operational Test and Evaluation, January 23rd, 2024.

### Invited Talks

1. "Navigating Our AI-Enabled Future in High-Stakes Domains," invited talk at the Medtronic Cardiac Rhythm Management AI Summit, Minneapolis, Minnesota, August 19th, 2025.
2. "Navigating Our AI-Augmented Future in Software Engineering," keynote talk at the International Workshop on Envisioning the AI-augmented Software Development Life Cycle collocated with the ACM Foundations of Software Engineering (FSE) conference, June 26th, 2025, Trondheim, Norway.
3. "LLMs in Software Engineering & Software Assurance," invited panelist at the HCI International Conference, Gothenburg, Sweden, June 25<sup>th</sup>, 2025.
4. "Navigating Our AI-Enabled Future in High-Stakes Domains," keynote speaker at the 26th IEEE International Conference on Mobile Data Management, Irvine, CA, June 3rd, 2025.
5. "Unbinding Prometheus: How Generative AI is Liberating Computational Thinking from Coding," keynote speaker at the Medtronic Cardiac Rhythm Management AI Summit, Minneapolis, Minnesota, May 22nd, 2025.
6. "Navigating Our AI-Enabled Future in Defense & Other High-Stakes Domains," keynote speaker at the AFOTEC Data & Analyst Community Summit, Albuquerque, New Mexico, May 5th, 2025.
7. "Surfing the AI Wave: A Human-Centered Approach to Innovation and Ethics," invited speaker for the Tack Lecture, William & Mary, Williamsburg, VA, April 9th, 2025.
8. "Generative Artificial Intelligence in the DoD Acquisition Lifecycle," invited panelist for an AIRC webinar, January 6th, 2025.
9. "Test & Evaluation for Emerging Technologies," keynote talk for the DoD PSA 101 lecture series, Pentagon, November 22nd, 2024.
10. "Test & Evaluation for Emerging Technologies," keynote talk at the Sixth Annual Recent Advances in Artificial Intelligence for National Security (RAAINS) workshop, MIT Lincoln Labs, November 18-21, 2024.
11. "Test & Evaluation for Emerging Technologies," keynote talk at the 16th Annual Research Review of the Systems Engineering Research Center (SERC), Washington, DC, November 12th, 2024.
12. "Test & Evaluation for Emerging Technologies," keynote talk at the National Reconnaissance Office, Chantilly, VA, November 7th, 2024.
13. "Test & Evaluation for Emerging Technologies," invited panelist at the ITEA Annual International Test & Evaluation Symposium, Huntsville, AL, November 5th 2024.
14. "Operational Test & Evaluation Considerations for Emerging Technologies," keynote talk for the 27th Annual NDIA Systems and Mission Engineering Conference, Norfolk, VA, October 29th, 2024.
15. "Counter Unmanned Systems (C-UXS): Emerging Technologies, Testing, & Evaluation," keynote talk for the 3rd Annual Unmanned Systems West conference, San Diego, CA, September 26th,

2024.

16. "Emerging Cyber & AI Technologies and Test & Evaluation Considerations," keynote talk for the International Test & Evaluation Association (ITEA) Cybersecurity Workshop, Orlando, FL, September 19th 2024.
17. "DO&E Unmanned Air Systems Critical Examination of CUAS Technology and Strategy," invited keynote talk at the IDGA Counter-USA Summit, Crystal City, VA, August 28th, 2024.
18. "Strategies and Tactics for Operational and Life Fire Test and Evaluation," keynote talk for the Assurance Evidence for continuously Evolving Real-Time Systems (ASERT) workshop, Arlington, VA, July 30th, 2024.
19. "Strategies and Tactics for Operational and Life Fire Test and Evaluation," keynote talk for the Defense Science Study Group (DSSG) meeting at the Institute for Defense Analysis (IDA), July 16th, 2024.
20. "Generative AI and Software Engineering Education," invited panelist for an SEI webinar, June 27th, 2024.
21. "The MOSA Relationship with Operational and Life Fire Testing," invited keynote talk at MOSA Industry and Government Summit, National Harbor, MD, June 18th, 2024.
22. "Testing for Assured Space Resilience," invited keynote talk at Summit 2024: Spectrum Control for Resilient Space Operations, Bedford, MA, June 11th, 2024.
23. "Assessing the Adequacy of Current GPS Equipment for Future Operational Effectiveness," invited keynote talk at the Assured PNT Summit, Washington, DC, May 30th, 2024.
24. "Counter UAS (C-UAS): Emerging Technologies, Testing, & Evaluation," invited keynote talk at the 3rd Annual National Congress on Counter UAS Technology, Washington DC, May 23rd, 2024.
25. "View from the Bridge of DoD on Operational & Live Fire Test & Evaluation," invited keynote talk at the NI Connect conference, Austin, Texas, May 20th, 2024.
26. "Test & Evaluation for the New Operational Environment," invited keynote talk at the Air Dominance Summit, Tuesday, May 14th, 2024, Las Vegas.
27. "Software Construction Through Compositional Correctness," keynote panel at the 27th Ibero-American Conference on Software Engineering (CibSE 2024), May 8th, 2024, Curitiba, Brazil.
28. "The Role of MOSA in DoD System Acquisition and Assessment," keynote talk at the MOSA Defense Summit, National Harbor, MD, April 18th, 2024.
29. "DOT&E Background and Future Plans," keynote talk at the DATAWorks conference, Arlington, VA, April 17th, 2024.
30. "Navigating Our AI Enabled Future in Defense and Other High Stakes Domains," keynote talk at the AFCEA New Horizons Conference, Boston, MA, March 11th, 2024.
31. "Navigating Our AI-Augmented Future," invited talk for the 101st Air Assault Division Artillery (DIVARTY), Vanderbilt University, March 7th, 2024.
32. Invited panelist for the Vanderbilt webinar on "Navigating Our AI-Augmented Future in National Security and Other High-Stakes Domains," March 4th, 2024.
33. "ChatGPT is Just the Beginning: Generative AI will Transform Computing," invited talk for the University School of Nashville, Nashville, TN, February 26th, 2024.
34. Invited speaker for the keynote panel on "Accelerating Leadership and Strategic Advantage in Software Engineering" at the NASA JPL Software Symposium on February 15, 2024, Pasadena, CA.
35. Ask Us Anything: The Future of Software Engineering and Acquisition with Generative AI, invited panelist for an SEI webinar on generative AI for software, January 24th, 2024.
36. Testified before the United States Senate Armed Services Committee at my confirmation hearing for the position of Director of Operational Test and Evaluation, January 23rd, 2024.
37. "Navigating Our AI-Augmented Future," invited talk for the Oak Ridge National Labs, December 8th, 2023.
38. "Assuring the Future of Software Engineering & AI Engineering," invited talk at the AFSEC

Independence Verification Summit, December 6th, 2023.

39. "Navigating Our AI-Augmented Future," invited talk for the AI & Local Business Leaders Event, Vanderbilt University, November 7th, 2023.
40. "Assuring the Future of Software Engineering & AI Engineering," invited talk for the Huntsville Chapter of the IEEE AESS Society, November 2nd, 2023.
41. "Navigating the Future of AI-Augmented Research & Education", invited talk for the 30th Pattern Languages of Programming conference, Allerton Park, IL, October 23rd, 2023.
42. "Navigating the Future of AI-Augmented Research & Education," invited talk for the Computer Science department at the College of William and Mary, October 20th, 2023.
43. "Ask Us Anything: Generative AI Edition," invited panelist for an SEI webinar on generative AI, September 26th, 2023.
44. "Assuring the Future of Software Engineering & AI Engineering," invited talk for the U.S. Naval Research Laboratory, June 27th 2023.
45. "Assuring the Future of Software Engineering and AI Engineering," invited keynote talk at the NSF and NITRD workshop on U.S. Leadership in Software Engineering & AI Engineering: Critical Needs & Priorities, Alexandria, VA, June 20th 2023.
46. "ChatGPT - The Future of the Classroom Webinar," invited presentation for the Vanderbilt Alumni Association, May 18th, 2023.
47. "Applying ChatGPT to Computer Science Courses at Vanderbilt," invited talk at the Spring AI Revolutions Symposium, Vanderbilt University, March 28th 2023.
48. "ChatGPT - Why It Matters," invited presentation for webinar for the Vanderbilt Alumni Association, March 21st, 2023.
49. "Software Construction Through Compositional Correctness," invited panelist for Scientific Software Engineering Seminar Series: Emerging Frontiers in Software Engineering—NA4SE Panel Presentation, Sandia Labs, December 7th, 2022.
50. "Architecting the Systems of the Future: A Research Agenda," invited keynote talk at the Doctoral Symposium for the 23rd ACM/IFIP International Conference on Middleware, November 7th, 2022.
51. "Assuring Continuously Evolving Software Systems and Software Construction Through Compositional Correctness," invited panelist for the 26th International Conference on Reliable Software Technologies (AEIC 2022) 14-17 June 2022, Ghent, Belgium.
52. "Assuring Continuously Evolving Software Systems and Software Construction Through Compositional Correctness," invited panelist for the Envisioning the Future of Software Engineering Panel Session at the International Conference on Software & Systems Processes, May 20th 2022.
53. "Entering the Gray Zone: The Changing Face of Conflict," moderated a panel at the Summit on Modern Conflict and Emerging Threats, Vanderbilt University, Nashville, TN, May 5th, 2022.
54. "Architecting the Systems of the Future: A Research Agenda," invited keynote talk at the Doctoral Symposium for the 22nd ACM/IFIP International Conference on Middleware, December 6th, 2021.
55. "Cyber- and Physical-Security Risks," Southern Illinois University course on Domestic Terrorism, July 22nd, 2021.
56. "Architecting the Future of Software Engineering," invited keynote talk at the 16th International Conference on Software Technologies, July 8th, 2021.
57. "Challenges of Certifying Adaptive Dynamic Computing Environments," ARLIS Workshop, January 28th, 2021.
58. "Cyber-Security and You: Practicing Safe Surfing on the Internet," the National Active and Retired Federal Employees (NARFE) chapter, Nashville TN, January 13th, 2021.
59. "Challenges of Certifying Adaptive Dynamic Computing Environments," DARPA/SEI Software Engineering Grand Challenges and Future Visions Workshop, December 1st, 2020.
60. "Surveillance Capitalism and You," invited talk at the Southeast Science Boot Camp, Nashville, TN, May 29th, 2019.

61. "Diversify Sponsorship of Your Research: Getting Funding from the Department of Defense," Office of Research Development and Support Workshop, October 22nd, 2018, Nashville, TN.
62. "Surveillance Capitalism and You," invited talk at the Memorizing the Future: Collecting in the 21st Century Conference, Nashville, TN, October 6th, 2018.
63. "Aligning Incentives to Enable More Effective Organic Software Infrastructure for the DoD," DoD Organic Software Infrastructure Workshop, Arlington VA, August 13th, 2018.
64. "The Blockchain: What It is and Why It Matters to Us," Transforming Dermatology in the Digital Era, Memorial Sloan Kettering Cancer Center, October 25, 2018, NY, NY, USA.
65. "Aligning Incentives to Enable Modular Open Software for DoD Combat Systems," Modular Open Systems Summit, May 1st, 2018, Washington DC.
66. "The Blockchain: What It is and Why It Matters to Us," Society of Women Engineers, Vanderbilt University, March 14th, 2018.
67. "The Blockchain: What It is and Why It Matters to Us," Invited keynote at the Workshop on Middleware and Applications for the Internet of Things, (co-located with the 2017 Middleware conference in Las Vegas, USA), December 11th and 12th, 2017.
68. "The Blockchain: What It is and Why It Matters," Vanderbilt University, Nashville, TN, November 28th, 2017.
69. "The Blockchain: What It is and Why It Matters," INTERFACE Nashville conference, Nashville, TN, August 24th, 2017.
70. "Applying Blockchain to Healthcare Systems," panel presentation at the Siemens Blockchain Conference, Nuremberg, Germany, May 10th, 2017.
71. "A Primer on Big Data," Vanderbilt University Board of Trust meeting, April 21st, 2017, Nashville TN.
72. "The Past, Present, and Future of MOOCs and Their Importance for Software Engineering," Distinguished Lecture, University of Illinois Chicago, Chicago, IL, November 18th, 2016.
73. "Agility-at-Scale for Safety- and Mission-Critical Industrial-Scale Systems," INFORMS Annual Conference, Nashville, TN November 13th, 2016.
74. "Product Line Architectures for Open System Architectures," Varian, Winnipeg, Canada, October 7th, 2016.
75. "Agility-at-Scale for Safety- and Mission-Critical Industrial-Scale Systems," Siemens Architecture Workshop, Tarrytown, NY, September 27th, 2016.
76. "Product Line Architectures for Oncology Treatment Services," Varian, Palo Alto, CA, September 16th, 2016.
77. "Innovation and Speed: The Rise of Open Systems," the United States Technology Leadership Council, Reston, VA, August 24th, 2016.
78. "Elastic Software Infrastructure to Support the Industrial Internet," the Siemens CPS Workshop, Munich, Germany, August 1st, 2016.
79. "Challenges of Certifying Adaptive Dynamic Computing Environments," Workshop on Safety And Control for AI, Sponsored by the White House Office of Science and Technology Policy and Carnegie Mellon University, Pittsburgh, PA, June 28th, 2016.
80. "Keeping an Unfair Advantage in a Globalized and Commoditized World," Raytheon Symposium, Tucson, AZ, May 5th, 2016.
81. "Towards Technical Reference Frameworks to Support Open System Architecture Initiatives," Office of the Secretary of Defense (OSD) System of Systems Engineering Collaborators Information Exchange, December 15th 2015.
82. "Enterprise System of Systems Engineering (SoSE) Integration and Innovation," presentation at the US Marine Corp Business Management Association meeting, Quantico, VA, December 10th, 2015.
83. "An Architecture Grand Challenge: DOD's push for Open Systems Architecture," panel presentation at the Software Solutions Conference, Crystal City, VA, November 17th, 2015.

84. "Elastic Software Infrastructure to Support the Industrial Internet," the Siemens CPS Workshop, Munich, Germany, September 29th, 2015.
85. "An Overview of Mobile and mHealth Activities at ISIS and Vandy EECS," Patient Engagement Emerging Technologies, Vanderbilt University, Nashville, TN, August 10, 2015.
86. "Mobile Cloud Computing with Android," Google I/O, Mercury Intermedia Systems, Nashville, TN, May 28th, 2015.
87. "An Architecture Grand Challenge: DOD's push for Open Systems Architecture," panel presentation at the SATURN 2015 Conference, Baltimore, MD, April 27th, 2015.
88. "Elastic Software Infrastructure to Support Computing Clouds for Cyber-Physical Systems," Distinguish Lecture, Texas A&M, April 27th, 2015.
89. "Elastic Software Infrastructure to Support Computing Clouds for Cyber-Physical Systems", Boeing Distinguished Researcher And Scholar Seminar (B-DRASS) series, March 20th, Huntington Beach, CA.
90. "Elastic Software Infrastructure to Support Computing Clouds for Cyber-Physical Systems," Distinguished Lecture, University of California, Irvine, February 27th, 2015.
91. "Elastic Software Infrastructure to Support Computing Clouds for Cyber-Physical Systems," Varian, Palo Alto, CA, January 15th, 2015.
92. "Keeping an Unfair Advantage in a Globalized and Commoditized World," Open Architecture Summit, Washington DC, November 4th, 2014.
93. "Proposal for a Professional Master's degree in Computer Science," invited talk at Vanderbilt University School of Engineering's Board of Visitor's meeting, October 10th, 2014.
94. "The Past, Present, and Future of Open System Architecture Initiatives," invited keynote at the Future Airborne Capabilities Environment meeting, Nashville, TN, September 24th.
95. "Future Proofing Research and Development Investments in a Globalized, Commoditized World," Boeing Technical Excellence Conference, May 20th, 2014, St. Louis, MO.
96. "Elastic Software Infrastructure to Support the Computing Clouds for Cyber-Physical Systems (CC4CPS)," Securboration Conference, November 12th, 2013, Melbourne, Florida.
97. "The Importance of Automated Testing in Open Systems Architecture Initiatives," Open Architecture Summit, November 12th, 2013, Washington DC.
98. Conference on Cloud and Mobile Computing, Siemens Corporate Research, Princeton, NJ, November 5th, 2013.
99. "Overview of the Technology Entrepreneurship Task Force," Innovation, Imagination, and Introductions: A Conversation with Entrepreneurs, Vanderbilt University, October 24th, 2013.
100. "Producing and Delivering a Coursera MOOC on Pattern-Oriented Software Architecture for Concurrent and Networked Software," Vanderbilt University's Faculty Senate committee on Strategic Planning and Academic Freedom, October 23rd, 2013.
101. "Elastic Software Infrastructure to Support the Industrial Internet," RTI Webinar series, October 23rd, 2013.
102. "The Importance of Applying Agility to DoD Software Initiatives," IEEE Computer Society Lockheed Martin webinar series, October 10th, 2013.
103. "Technology Entrepreneurship Task force: Charter and Progress Update," Vanderbilt University School of Engineering Board of Visitors meeting, October 4th, 2013.
104. "Stochastic Hybrid Systems Modeling and Middleware-enabled DDDAS for Next-generation USAF Combat Systems," AFOSR DDDAS PI meeting, Arlington, VA, October 1st, 2013.
105. "Producing and Delivering a Coursera MOOC on Pattern-Oriented Software Architecture for Concurrent and Networked Software," WithIT seminar, Vanderbilt University, September 12th, 2013.
106. "Applying Agility to the US Department of Defense Common Operating Platform Environment Initiatives," Interoperable Open Architecture conference, Washington DC, September 11th, 2013.

107. "Software Infrastructure Support of Computing Clouds for Cyber-Physical Systems," invited talk at Real-Time Innovations, July 31st, 2013, Sunnyvale, California.
108. "Introduction to the Institute for Software Integrated Systems," Nashville Entrepreneur Center, July 15th, 2013.
109. "Surviving the Coursera Digital Learning Experience," Coursera-in-TN Conference, Vanderbilt University, Nashville, TN, June 24th, 2013.
110. "Quo Vadis ISORC?" Panel presentation at ISORC 2013 Conference, June 19th, 2013, Paderborn, Germany.
111. "Software Infrastructure Support of Computing Clouds for Cyber-Physical Systems," invited keynote for ISORC 2013 Conference, June 19th, 2013, Paderborn, Germany.
112. "Towards Programming Models and Paradigms for Computing Clouds that Support Cyber-Physical Systems," NSF Workshop on Computing Clouds for Cyber-Physical Systems, March 15th, 2013, Ballston, VA.
113. "Built to Last: Planning Your Career as an Engineer," STEM contest on Securing Cyber Space, Brentwood High School, March 9th, 2013, Nashville, TN.
114. "Experience with Digital Learning and MOOCs at Vanderbilt," Nashville, TN, Feb 22nd, 2013.
115. "Software Design: Is It Really Better to Look Good Than to Feel Good?" World IA Day, Nashville, TN, Feb 9th, 2013.
116. "Pattern-Oriented Software Architectures: Patterns and Frameworks for Concurrent and Networked Software," PhreakNIC 2012, Murfreesboro, TN, November 9th, 2012.
117. "Applying Agility to the US Department of Defence Common Operating Platform Environment Initiatives," Interoperable Open Architecture 2012, 29 - 31 October, 2012, London, UK.
118. "Open System Architectures: Challenges and Success Drivers," OA Summit conference, Washington, DC, October 18th, 2012.
119. "Dependable Computing Clouds for Cyber-Physical Systems," Dependability Issues in Cloud Computing Workshop, October 11th, 2012, Irvine, CA.
120. "Computing Clouds for Cyber-Physical Systems," Reliable Cloud Infrastructure for CPS Applications Workshop, October 8th, 2012, Irvine, CA.
121. "Common Operating Platform Environments: Challenges and Success Drivers," Navy Open Systems Architecture workshop, Ballston, VA, September 27th, 2012.
122. "Meeting the Challenges of Enterprise Distributed Real-time and Embedded Systems," talk for Honeywell Aerospace, September 21, 2012.
123. "Architecture-Led Iterative and Incremental Development for Common Operating Platform Environments," NITRD Software Design and Productivity meeting, National Coordination Office, Ballston, VA, July 13th, 2012.
124. "Cyber-physical multi-core Optimization for Resource and cache effectS," Software-Intensive Systems Producibility workshop, Arlington VA, June 5th, 2012.
125. "Applying Agility to DoD Common Operating Platform Environment Initiatives", SEI Agile Research Forum, May 22nd, 2012.
126. "Meeting the Challenges of Enterprise Distributed Real-time and Embedded Systems," keynote talk at the SATURN Conference 2012 May 7-11, 2012, St. Petersburg, FL.
127. "Reflections on 20 Years of Architecture for Distributed Real-time and Embedded Systems," SATURN Conference 2012 May 7-11, 2012, St. Petersburg, FL.
128. "US Naval Open Systems Architecture Strategy," SATURN Conference 2012 May 7-11, 2012, St. Petersburg, FL.
129. "Towards Open Systems Architectures for Distributed Real-time and Embedded Systems," The Center for Embedded Systems for Critical Applications, Annual Workshop, Virginia Tech, Blackburg, VA April 21st, 2012.
130. "Overview of the SEI Strategic Research Plan," ASD(R&E) Annual Program Review, December 7th,

2011, Pittsburgh, PA.

131. "Overview of the SEI Strategic Research Plan," Acquisition Support Program meeting, November 16th, 2011, Pittsburgh, PA.
132. "Conducting Leading-Edge Software R&D in a Globalized, Commoditized World," NITRD Software Design and Productivity meeting, National Coordination Office, Ballston, VA, November 3rd, 2011.
133. "A Technical Assessment of Open Architecture Systems for Military Use," Interoperable Open Architecture, 26th-28th October 2011, London, UK.
134. "Conducting Leading-Edge Software R&D in a Globalized, Commoditized World," Technovation 2011, Carnegie Mellon University, September 29th, 2011.
135. "CTO Report," SEI Board of Visitors Meeting, Arlington, VA, September 27th, 2011.
136. "Overview of the SEI Strategic Research Plan," Joint Advisory Committee Meeting, Arlington, VA, September 26th, 2011.
137. "Successful Development Efforts: Standards, People, & Culture: The Enterprise Perspective," Software Assurance (SwA) Forum, September 16th, 2011, Arlington, VA.
138. "Ultra-Large-Scale (ULS) Cyberphysical Systems and Their Impact on Technology and Society," University of Salzburg, June 30th, 2011, Salzburg, Austria.
139. "Ultra-Large-Scale (ULS) Cyberphysical Systems and Their Impact on Technology and Society," ARTEMIS conference, June 29th, 2011, Linz, Austria.
140. "Ultra-Large-Scale Systems and Their Impact on the DoD," Systems and Software Technology Conference Committee, keynote presentation at the 23rd Systems and Software Technology Conference, May 16-19, 2011, Salt Lake City, Utah.
141. "Ultra-Large-Scale Systems and their Impact on Technology and Society," keynote presentation at the International Symposium on Object-Oriented Real-time Distributed Computing/iAç (ISORC), Newport Beach, CA, March 29th, 2011.
142. "Software-reliant Systems Research at the Software Engineering Institute," Raytheon, Sudbury, MA, March 10, 2011.
143. "Review of COE Practices," US Army Senior Leadership Education Program, Pittsburgh, PA, January 20th, 2011.
144. "Software Producibility for Defense," US Army Senior Leadership Education Program, Pittsburgh, PA, January 18th, 2011.
145. "SEI Research: The Shape of Things to Come," ASP Meeting, Software Engineering Institute, Pittsburgh, PA, December 9th, 2010.
146. "R&D at ASP," ASP Air Force Training Day, Software Engineering Institute, Pittsburgh, PA, December 9th, 2010.
147. "Software-reliant Systems Research at the Software Engineering Institute," Siemens Corporate Research, Princeton, NJ, November 22nd, 2010.
148. "Taming the Complexity of Software-Reliant Systems," Software Engineering Process Group conference, Colombia, South America, November 11th, 2010.
149. "SEI Technical Presentations," Joint Advisory Committee Meeting, Arlington, VA, October 26th, 2010.
150. "SEI Research: The Shape of Things to Come," ASP Meeting, Software Engineering Institute, Pittsburgh, PA, October 20th, 2010.
151. "SEI Research: The Shape of Things to Come," SEPM Meeting, Software Engineering Institute, Pittsburgh, PA, October 19th, 2010.
152. "Strategic Directions for Research at the SEI," RTSS Offsite Meeting, Pittsburgh, PA, October 12th, 2010.
153. "The World is Flat and What You Can Do About It," Family Weekend, October 9th, 2010, Vanderbilt University.
154. "SEI Research: The Shape of Things to Come," SEI Board of Visitor's Meeting, Arlington, VA, Sep-

tember 28th, 2010.

155. "SEI Research: The Shape of Things to Come," PD&T Meeting, Software Engineering Institute, Pittsburgh, PA, September 20th, 2010.
156. "Introduction and Initial Thoughts," RTSS Meeting, Software Engineering Institute, Pittsburgh, PA, August 19th, 2010.
157. "The Impact of Ultra-Large-Scale Systems on DoD Operations," Congressional R&D Caucus, Rayburn Building, Washington DC, January 19th, 2010.
158. "The World is Flat and What You Can Do About It," Explorers meeting, January 12th, 2010, Vanderbilt University.
159. "Expectations for University - Industry Collaborative Research in CPS," Computing Community Consortium Workshop on New Forms of Industry-Academy Partnerships in CPS Research, George Mason University, May 19th, 2009.
160. "How Good is Your SOA?," Panel presentation at the AFRL QED PI meeting, April 28th, 2009, Washington DC.
161. "The World is Flat and What You Can Do About It," ES 140, Computer Science module, October 31st, 2008, Vanderbilt University.
162. "Meeting the Challenges of Ultra-Large-Scale Distributed Real-time and Embedded Systems with QoS-enabled Middleware and Model-Driven Engineering," Panel on Growing and Sustaining Ultra Large Scale (ULS) Systems, OOPSLA 2008, Nashville TN, October 21-23 2008.
163. "The World is Flat and What You Can Do About It," Family Weekend Faculty Lecture, Vanderbilt University, October 3rd, 2008.
164. "The World is Flat and What You Can Do About It," Senior Design Seminar, Vanderbilt University, September 17th, 2008.
165. "The World is Flat and What You Can Do About It," CS WithIT Seminar, Vanderbilt University, September 11th, 2008.
166. "The Managed Motorway: Real-time Vehicle Scheduling - A Research Agenda," Qualcomm, July 28th, 2008, San Diego, CA.
167. "Meeting the Challenges of Mission-Critical Distributed Event-Based Systems with QoS-enabled Middleware and Model-Driven Engineering," 2nd International Conference on Distributed Event-Based Systems (DEBS), Rome Italy, July 2-4, 2008.
168. "Meeting the Challenges of Distributed Real-time and Embedded Systems with QoS-enabled Middleware and Model-Driven Engineering," SPAWAR, April 29th, 2008.
169. "Meeting the Challenges of Distributed Real-time and Embedded Systems with QoS-enabled Middleware and Model-Driven Engineering," Northrop Grumman, Boulder Colorado, April 25th, 2008.
170. "Experimentation Environment for QED," AFRL Information Management PI Meeting, April 16 2008, Georgetown, Washington, DC.
171. "Adaptive System Infrastructure for Ultra-Large-Scale Systems," SMART Conference, Carnegie Mellon University, March 6th, 2008.
172. "Experimentation Environment for QED", Air Force Research Lab, Rome, NY, March 4th, 2008.
173. "Ultra-Large-Scale (ULS) Systems and their Impact on Technology and Society," Clemson University, January 31st, 2008.
174. "Meeting the Challenges of Ultra-Large-Scale Distributed Real-time and Embedded Systems with QoS-enabled Middleware and Model-Driven Engineering, invited keynote talk at Middleware 2007, Irvine, CA, November 29th, 2007.
175. "The World is Flat and What You Can Do About It," Senior Design Seminar, Vanderbilt University, November 14th, 2007.
176. "Technology Candidates for QED," AFRL retreat, Minnowbrook, NY, October 23, 2007.
177. "Overview of ISIS and Proposed IU/CRC R&D Projects," Crystal City, VA, October 19th, 2007.
178. The Future of CORBA for Distributed Real-time and Embedded Systems, International Conference

- on Accelerator and Large Experimental Physics Control Systems, October 17, 2007, Knoxville, TN.
179. "AF-TRUST: Project Overview," Air Force Scientific Advisory Board review, Rome, NY, October 15th, 2007.
  180. "Meeting the Challenges of Distributed Real-time and Embedded Systems with Product-Line Architectures," August 1st, 2007, Trinity College, Dublin, Ireland.
  181. "Model Driven Engineering of Product-Line Architectures for Distributed Real-time and Embedded Systems," July 5th, 2007, University of Limerick, Ireland.
  182. "Meeting the Challenges of Mission-Critical Systems with Middleware and Model Driven Engineering", OMG Technical Meeting, June 27, 2007, Brussels, Belgium.
  183. Meeting the Challenges of Ultra-Large-Scale Distributed Real-time and Embedded Systems with Model-Driven Engineering, June 19, 2007, Trinity College, Dublin.
  184. Strategic Technology Positioning, PrismTechnologies "Middleware Fest", June 14, 2007, Newcastle, UK.
  185. "Hurdles for Wireless Communication Systems R&D and Some Ways to Overcome Them," OSD Workshop on Wireless Communication Systems, Rosslyn, VA, May 22nd, 2007.
  186. "The World is Flat from a Computer Scientists Point of View," Vanderbilt University Commencement talk, May 10th, 2007.
  187. Meeting the Challenges of Ultra-Large-Scale Distributed Real-time and Embedded Systems, invited keynote at the the 10th IEEE International Symposium on Object/Component/Service-oriented Real-time Distributed Computing, May 7-9, 2007, Santorini Island, Greece.
  188. "Enhanced QoS for the GIG," AFRL JBI PI meeting, Georgetown, DC, April 24, 2007.
  189. "Meeting the Challenges of Ultra-Large-Scale Distributed Real-time and Embedded Systems," Invited keynote at the 15th International Workshop on Parallel and Distributed Real-Time Systems (WDPRTS), March 26-27, 2007, Long Beach, California.
  190. "The CORBA C++ Mapping: Beyond Repair?," OMG Meeting, San Diego, CA, March 27th, 2007.
  191. "Meeting the Challenges of Ultra-Large-Scale Systems via Model-Driven Engineering," Distinguished Lecturer Series, Florida International University, Miami, Florida, Feb 2, 2007.
  192. Model Driven Engineering and QoS-enabled Component Middleware for DRE Systems, Invited talk at the European Space Agency Operations Center, Darmstadt, Germany, Wednesday January 24, 2007.
  193. "Software Wind Tunnel (SWiT) Concept of Operations and System Architecture", AFRL Software and Systems Test Track workshop, Arlington, VA, January 19, 2007.
  194. "Latest Breakthroughs in SDR Software Development Using Model Driven Technologies," Rockwell Collins, Cedar Rapids, IA, December 14th, 2006.
  195. "Educating the DoD Workforce in a Flat World," 2006 Raytheon Integrated Defense Systems' SW Engr. Directorate Off-Site Meeting, New Castle, New Hampshire, December 7, 2006.
  196. "The Ultra Challenge: Software Systems Beyond Big," panelist at OOPSLA 2006, October, 2006, Portland, OR.
  197. "Software Wind Tunnel (SWiT) Architecture," AFRL Software and Systems Test Track Workshop, Cherry Hill, NJ, October 2nd, 2006.
  198. "The World is Flat and What You Can Do About it," Vanderbilt University, September 12th, 2006.
  199. "The World is Flat and What You Can Do About it," Vanderbilt University, September 8th, 2006.
  200. "Meeting the Challenges of Ultra-Large-Scale Systems via Model-Driven Engineering," Network-Centric Operations Industry Consortium, Reston, VA, August 2nd 2006.
  201. "Model Driven Architecture Roundtable," invited panelist at the Software Engineering Institute, Pittsburgh, PA, June 1st, 2006.
  202. "Enhanced QoS for the GIG," AFRL JBI PI meeting, Tysons Corner, VA, April 11, 2006.
  203. "Model Driven Engineering for Distributed Real-time and Embedded Systems," Distinguished Lec-

- turer Series talk at Colorado State University, Ft. Collins, CO, April 10, 2006.
204. "Win-Win Partnership of Academia and Industry: Why Should We Care? Where Is Our Common Future?" invited panelist at the 12th IEEE Real-Time and Embedded Technology and Applications Symposium April 6, 2006, San Jose, California.
  205. "Meeting the Challenges of Ultra-Large-Scale Real-time Systems," invited keynote at the IEEE Real-Time and Embedded Technology and Applications Symposium April 5, 2006, San Jose, California.
  206. "Model-driven Development for Distributed Real-time and Embedded Systems," ACM Meeting at Middle Tennessee State University, March 7th, 2006.
  207. "Real-time, Scalable, and Secure Information Management for the GIG," Scientific Advisory Board Meeting, Rome, NY, November 16th, 2005.
  208. "Real-time, Scalable, and Secure Information Management for the GIG," Airforce Research Lab, Rome, NY, November 3rd, 2005.
  209. "Model-driven Development for Distributed Real-time and Embedded Systems," Distinguished Speaker Talk at BBN Technologies, Cambridge, MA, October 27, 2005.
  210. "Challenges and Research Areas for QoS-enabled Information Management in Tactical Systems of Systems," AFRL Minnowbrook Workshop, Adirondack Mountains, NY, October 21st, 2005.
  211. "Model-driven Development for Distributed Real-time and Embedded Systems," Invited keynote at MODELS 2005, ACM/IEEE 8th International Conference on Model Driven Engineering Languages and Systems, Half Moon Resort, Montego Bay, Jamaica, October 5-7, 2005.
  212. "The World is Flat and What You Can Do About it," CS WithIT Seminar, Vanderbilt University, September 22, 2005.
  213. "Why Software Reuse has Failed and How to Make it Work for You," Motorola 2005, Symposium on Software, Systems, and Simulation, Schaumburg, IL, September 16th, 2005.
  214. "Pattern-Oriented Software Architecture," 12th Pattern Language of Programming Conference, Allerton Park, Illinois, September 7-10, 2005.
  215. "Model-Driven Development of Distributed Real-time and Embedded Systems," 12th Pattern Language of Programming Conference, Allerton Park, Illinois, September 7-10, 2005.
  216. "Model-driven Development for Distributed Real-time and Embedded Systems," Siemens Corporate Research, Princeton, NJ, August 26th.
  217. "Model-driven QoS Provisioning for Real-time CORBA and CCM DRE Systems," 6th OMG Real-time/Embedded CORBA workshop, Washington DC, July 11-14, 2005.
  218. "A Proposed R&D Agenda for the Software Technology Laboratory," Lockheed Martin Advanced Technology Lab, Cherry Hill, NJ, June 28th, 2005.
  219. "Model-Driven Development of Product-Line Architectures for DRE Systems," 11th Siemens Software Architecture Improvement Group (SAIG), Buffalo Grove, IL June 22, 2005.
  220. "Business Drives for Platforms," panel at the 11th Siemens Software Architecture Improvement Group (SAIG), Buffalo Grove, IL June 22, 2005.
  221. "Model Driven Development for Distributed Real-time and Embedded Systems," Lockheed Martin Advanced Technology Lab, Cherry Hill, NJ, June 15th, 2005.
  222. "Approaches for Supporting Real-time QoS in JBI," JBI PI Meeting, Washington DC, May 24th, 2005.
  223. "Overcoming Hurdles of Software Producibility," OSD, Software Producibility Workshop, Arlington, VA, May 18, 2005.
  224. "Overview of Multi-Level Resource Management in ARMS," Fermilab, Chicago, IL, April 12th, 2005.
  225. "Model Driven Middleware for Distributed Real-time and Embedded Systems," University of Southern Alabama, April 8, 2005.
  226. "Model-Driven Development of Distributed Real-time and Embedded Systems," UAV Battlelab, Indian Springs, NV, February 10th, 2005.
  227. "The Future of Software and Systems Engineering," IEEE Meeting, Vanderbilt University, February 8th, 2005.

228. Model Driven Development of Distributed Real-time and Embedded Systems, panel at the OOP conference, Munich, Germany, January 27, 2005.
229. "Product-line Architecture Technologies for Distributed Real-time and Embedded Systems, Lockheed Martin, Moorestown, NJ, November 11, 2004.
230. "Model Driven Development of Distributed Real-time and Embedded Systems," invited panelist in the "Generative Programming: Past, Present, and Future," at the 3rd ACM International Conference on Generative Programming and Component Engineering, Vancouver, CA, October 24th 2004.
231. "Developing Combat Systems with Component Middleware and Models," Lockheed Martin, Moorestown, NJ, October 22, 2004.
232. "Model Driven Development of Distributed Real-time and Embedded Systems," Lockheed Martin Advanced Technology Lab, Cherry Hill, NJ, October 21, 2004.
233. "Model Driven Development of Distributed Real-time and Embedded Systems," Lockheed Martin Missile and Fire Control, Dallas, TX, October 13, 2004.
234. "Design of ARMS MLRM Components: CCM Based Design for Dynamic Resource Management," DARPA ARMS Technical Interchange Meeting, Plymouth, RI, October 7, 2004.
235. "Model Driven Middleware for Component-based Distributed Systems," keynote for The 8th International IEEE Enterprise Distributed Object Computing Conference, Monterey, California, September 22, 2004.
236. "Systems Science Challenge Area," TRUST NSF Science and Technology Review, UC Berkeley, September 12, 2004.
237. "Model Driven Development for Distributed Real-time and Embedded Systems," Lockheed Martin, Eagan, MN, August 31st, 2004.
238. "Model Driven Computing for Distributed Real-time and Embedded Systems," Telcordia, Piscataway, NJ, August 10th, 2004.
239. "Model Driven Computing for Distributed Real-time and Embedded Systems," Raytheon, Portsmouth, RI, August 9th, 2004.
240. "Distributed Object Computing with CORBA," Raytheon, Portsmouth, RI, August 9th, 2004.
241. "Model Driven Development of Distributed Real-time and Embedded Systems," Raytheon, Ft. Wayne, IN, July 27th, 2004.
242. "Model Driven Middleware for Distributed Real-time and Embedded Systems," panelist at the 5th OMG Real-time and Embedded Middleware Workshop, Reston, VA 2004.
243. "The Role of Open Standards, Open-Source Development, and Different Development Models and Processes on Industrializing Software," ARO Workshop on Software Reliability for FCS, Vanderbilt University, Nashville, Tennessee, May 18-19, 2004.
244. "Model Driven Middleware for Distributed Real-time and Embedded Systems," Keynote talk for the SIGS Software Engineering Today conference in Zurich, Switzerland, May 4-5, 2004.
245. "Model-Driven Development of Distributed Real-time and Embedded Systems," 10th Siemens Software Architecture Improvement Group (SAIG), Vienna, Austria, April 20-24, 2004.
246. "Adaptive and Reflective Middleware for Distributed, Real-time, and Embedded Systems," Purdue University, West Lafayette, Indiana, April 6, 2004.
247. "Model Driven Middleware for Distributed Real-time and Embedded Systems," *Technologies That Will Change the World* session at the Southeastern Software Engineering Conference, Huntsville, Alabama, March 30th, 2004.
248. "Advances in COTS Middleware for Distributed Real-time and Embedded Systems," Keynote for the International Conference on COTS-Based Software Systems (ICCBSS) 2004 in Redondo Beach, February 2-4, 2004.
249. Composable Middleware Components for High Confidence Network Embedded Systems, University of California, Berkeley, December 4th, 2003.
250. "Model Driven Middleware," TechConnect 2003, St. Louis, MO, October 1st, 2003.

251. "Advances in Model Driven Middleware for Distributed Real-time and Embedded Systems," the Model Integrated Computing PSIG meeting at the OMG Technical Meeting, September 10, 2003, Boston, MA.
252. Invited panelist for the "Research on DRE Systems" panel at the OMG Real-time Middleware Workshop, July 16, 2003, Arlington, VA.
253. "Advances in Model Driven Middleware for Distributed Real-time and Embedded Systems," the OMG Real-time Middleware Workshop, July 15, 2003, Arlington, VA.
254. Organizer and presenter for a panel on "Advances in Large-scale Distributed Real-time and Embedded Systems" at the 9th IEEE Real-time/Embedded Technology and Applications Symposium (RTAS), May 27-30, 2003, Washington, DC.
255. "Managing Project Risk for Combat Systems," The Southeastern Software Engineering Conference, Huntsville, Alabama, April 1st, 2003.
256. "Distributed Real-time and Embedded Systems at DARPA," OMG Workshop on Super Distributed Objects, Washington DC, Monday, November 18, 2002.
257. "Adaptive and Reflective Middleware for Distributed Real-time Systems," Workshop on High Performance, Fault Adaptive, Large Scale Real-time Systems, Vanderbilt University, November 14, 2002.
258. Invited panelist on "Objects and Real-time Systems" OOPSLA '02, Seattle, WA, November 8, 2002.
259. "An Overview of ACE+TAO," Boeing, Seattle, November 8th, 2002.
260. "Pattern-Oriented Software Architecture," Amazon, Seattle, WA, November 6th, 2002.
261. "Using Real-time CORBA Effectively: Patterns and Principles," CORBA Controls Workshop, Grenoble, France, October, 9th, 2002.
262. "Adaptive and Reflective Middleware for Distributed Real-time and Embedded Systems," EMSOFT 2002: Second Workshop on Embedded Software, Grenoble, France, October, 7-9th, 2002.
263. "Designing the Future of Embedded Systems at DARPA IXO," Keynote talk at the 6th Annual Workshop on High-Performance Embedded Computing (HPEC), September 25, Boston, MA.
264. "Open Distributed Computing Platforms," NSF/OSTP Workshop on Information Technology Research for Critical Infrastructure Protection, Lansdowne, VA, September 20th, 2002.
265. "Real-time Object-Oriented Middleware," Distributed Common Ground/Surface System Technical Review Group meeting, Mclean VA, September 19th, 2002.
266. "Research Advances in Middleware for Distributed, Real-time, and Embedded Systems," Computer Communications stream of the 17th IFIP World Computer Congress, Montreal, Canada, August 25-30, 2002.
267. "DARPA Thrusts in Embedded Computing," Mercury Computer Systems, Tyngsboro, MA, July 25th, 2002.
268. "Adaptive and Reflective Middleware for Distributed, Real-time, and Embedded Combat Systems," Boeing Space and Missile Systems, Anaheim, CA, July 9, 2002.
269. "Annual Report on Software Design and Productivity Coordinating Group," Interagency Working Group, ITR&D Spring Planning Meeting, NSF, Ballston, VA, May 10, 2002.
270. "Real-time CORBA Standardization: Past, Present, and Future," panelist in the "Standards Movements in Object-oriented Real-time Computing" panel at the ISORC 2002 Conference, Washington, DC, April 30, 2002.
271. "Towards Adaptive and Reflective Middleware for Distributed Real-time Embedded Systems," Moderator of the *Distributed, Real-time, and Embedded Middleware for Network-Centric Combat Systems* panel at the Software Technology Conference (STC) in Salt Lake City, Utah, April 29, 2002.
272. "Applying Architectural Patterns to Address Key Challenges of Distributed Software," Siemens Architecture Interworking Group, Chicago, IL, April 24, 2002.
273. "Towards Adaptive and Reflective Middleware for Distributed Real-time and Embedded Systems," Space and Missile Defense Command, Huntsville, AL, April 22, 2002.

274. "How to Maintain Superiority in the Face of the Commoditization of IT," tutorial at the UCI CEO Roundtable, Maui, Hawaii, April 12, 2002.
275. "Transformation or Transmogrification? Surviving the Commoditization of IT," panelist at the UCI CEO Roundtable, Maui, Hawaii, April 11, 2002.
276. "Patterns and Principles of Mission-critical Middleware," Henry Samueli School of Engineering Research Review, University of California, Irvine, March 14th, 2002.
277. "DARPA: an Agency Overview," CRA Academic Careers Workshop, Arlington, Virginia, February 10 - 12, 2002.
278. "Towards Adaptive and Reflective Middleware for Distributed, Real-time, and Embedded Systems," Electrical Engineering and Computer Science Department, Vanderbilt University, January 28th, 2002.
279. "Protecting Critical Cyber Infrastructure from Asymmetric Threats," panelist at the 7th IEEE Workshop on Object-oriented Real-time Dependable Systems, San Diego, CA, January 10, 2002.
280. "The Researcher's Dilemma: When Technology Success Causes Great Communities to Fail (at Mission-oriented R&D Agencies)," Software Design and Productivity Coordinating Group Workshop on New Visions for Software Design and Productivity: Research and Applications, Nashville, TN, December 13-14, 2001.
281. "Towards Adaptive and Reflective Middleware for Mission-Critical Systems," Computer Science Department, College of William and Mary, September 7th, 2001.
282. "Adaptive and Reflective Middleware Systems," Lockheed Martin, Moorestown, NJ, August 21st, 2001.
283. "Adaptive and Reflective Middleware Systems," United Technology Research Center, Hartford, Connecticut, June 28th, 2001.
284. "Adaptive and Reflective Middleware Systems," Raytheon Annual Processing Systems Technology Network (PSTN) Symposium, Lexington, MA, June 20th, 2001.
285. Invited presenter for the Vendors' Panel at the OMG 2nd Workshop on Real-time and Embedded Distributed Object Computing, June 4-7, 2001.
286. "Towards Pattern Languages and QoS-enabled Middleware for Distributed Real-time and Embedded Systems," DARPA ITO workshop on Embedded Software, Lake Tahoe, NV, October 8-10, 2001.
287. "TAO, CORBA, and the HLA/RTI", Keynote talk at the Fifth IEEE International Workshop on Distributed Simulation and Real Time Applications Cincinnati, Ohio, USA August 13-15, 2001.
288. "Patterns and Principles of Middleware for Distributed Real-time and Embedded Systems," Raytheon, Sudbury, March 29th, 2001.
289. "Adaptive and Reflective Middleware Systems," Distinguished Lecture at Florida Atlantic University, Boca Raton, FL, March 1st, 2001.
290. "Adaptive and Reflective Middleware for Mission-Critical Distributed and Embedded Systems," University of Alabama, Birmingham, AL, January 31st, 2001.
291. "Adaptive and Reflective Middleware for Mission-Critical Distributed and Embedded Systems," Telcordia, Morristown, NJ, November 20th, 2000.
292. "Adaptive and Reflective Middleware for Mission-Critical Distributed and Embedded Systems," George Mason University, Fairfax, VA, November 20th, 2000.
293. "Adaptive and Reflective Middleware for Mission-Critical Distributed and Embedded Systems," Lucent CORBA Forum, Naperville, IL, November 17th, 2000.
294. "Putting an ORB on a Diet," Session on *Performance and QoS of Embedded CORBA ORBs* at the OMG's Workshop on Embedded Object-Based Systems, January 17-19, 2001.
295. "Adaptive and Reflective Middleware Systems," Panelist in a session on "Highly Distributed Systems," at the IEEE Symposium on Applications and the Internet, San Diego, CA, January 10, 2001.
296. "Adaptive and Reflective Middleware Systems," Panelist at the NSF Networking PI meeting, Irvine California, November 1st, 2000.

297. "Surviving the Tornado: The Best Kept Secrets of R&D Success in the Internet Age," Keck Observatory, Hawaii, October 9th, 2000.
298. "Adaptive and Reflective Middleware Systems," BBN Technologies, Boston, MA, September 27th, 2000.
299. "Distributed Application Integration: Myth or Reality?" Keynote talk at 2nd International Symposium on Distributed Objects and Applications (DOA '00), OMG, Antwerp, Belgium, September 21st, 2000.
300. "Surviving the Tornado: The Best Kept Secrets of R&D Success in the Internet Age," Keynote talk at 2nd International Symposium on Distributed Objects and Applications (DOA '00), OMG, Antwerp, Belgium, September 21st, 2000.
301. "High Confidence Adaptive and Reflective Middleware: Fact or Fiction?" Keynote talk for the IFIP Fourth International Conference on Formal Methods for Open Object-Based Distributed Systems, (FMOODS 2000), Stanford University, Stanford, CA, September 7th, 2000.
302. "Adaptive and Reflective Middleware Systems," Lockheed Martin, Ft. Worth, TX, September 6th, 2000.
303. Pattern-oriented Software Architecture: Concurrent and Networked Objects, Raytheon, San Diego, August 25, 2000.
304. "Adaptive and Reflective Middleware Systems," Rockwell/Collins, Cedar Rapids, Iowa, August 22, 2000.
305. "Adaptive and Reflective Middleware Systems," Lockheed Martin, Eagan, MN, August 21, 2000.
306. "Adaptive and Reflective Middleware Systems," Honeywell Technology Center, Minneapolis, MN, August 18, 2000.
307. "Adaptive and Reflective Middleware Systems," Raytheon, Falls Church, VA, July 12, 2000.
308. "Applying Patterns to Develop High-performance and Real-time Object Request Brokers," Lockheed Martin, Eagan, Minnesota, May 19, 2000.
309. "Patterns and Principles of Real-time Object Request Brokers," Cisco, San Jose, April 12, 2000.
310. "Patterns and Principles of Real-time Object Request Brokers," BellSouth, Atlanta, Georgia, March 3, 2000.
311. "Patterns and Principles of Real-time Object Request Brokers," Distinguished Lecturer Series, Michigan State University, East Lansing, Michigan, October 21, 1999.
312. "Towards Minimum ORBs for Wireless Devices and Networks," OPENSIG '99 Workshop, Carnegie Mellon University, Pittsburgh, October, 14-15, 1999.
313. "Applying CORBA Fault Tolerant Mechanisms to Network Management," Lucent CORBA Forum, Naperville, IL, September 28th, 1999.
314. "CORBA for Real-time and Embedded Telecom Systems," Lucent CORBA Forum, Naperville, IL, September 28th, 1999.
315. "Patterns and Principles of Real-time Object Request Brokers," BEA, Munich, Germany, September 16th, 1999.
316. "Real-time CORBA – Fact or Fiction," Siemens CORBA Day, Munich, Germany, September 15th, 1999.
317. "Patterns and Principles of Real-time Object Request Brokers," Siemens MED, Erlangen, Germany, September 13th, 1999.
318. "Patterns and Principles of Real-time Object Request Brokers," RT DII COE TWG, Boeing, Seattle, WA August 25th, 1999.
319. "Patterns for Real-time Middleware," Microsoft, Redmond, WA, August 24th, 1999.
320. "Patterns and Principles of Real-time Object Request Brokers," Lockheed Martin, Eagan, Minnesota, June 22nd, 1999.
321. "Using the ACE Framework and Patterns to Develop OO Communication Software," Dreamworks SGK, Glendale, CA, May 5th, 1999.

322. "Why Telecom Reuse has Failed and how to Make it Work for You," Keynote talk at Nortel Design Forum, Ottawa, CA, April 22nd, 1999.
323. "QoS-enabled Middleware for Monitoring and Controlling High-Speed Networks and Endsystems," Lucent Bell Labs, Murray Hill, NJ, April 15th, 1999.
324. "Optimization Patterns for High-performance, Real-time Object Request Broker Middleware," University of California, Irvine, April, 2nd, 1999.
325. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," Lucent, Columbus, OH, March 18-19 and 25-26, 1999.
326. "Using Design Patterns, Frameworks, and Object-Oriented Communication Systems," Lucent, Holmdel, NJ, March 1-4, 1999.
327. Chaired a panel on "Research Directions for Middleware," NSF PI meeting, Washington, DC, January 24th, 1999.
328. "Principles and Patterns of High-performance Real-time CORBA," University of Southern California, Los Angeles, CA, December 10th, 1998.
329. "Real-time CORBA for Telecom – Fact or Fiction?" Bellcore, Morristown, NJ, December 1st, 1998.
330. "Design Patterns for Real-time Object Request Brokers," Silicon Valley Patterns Group, San Francisco, November 15, 1998.
331. "Why Reuse has Failed and how to Make it Work for You," Keynote talk at Lucent Software Symposium, October 27th, Murray Hill, NJ, 1998.
332. "Real-time CORBA – Fact or Fiction," Lucent CORBA Forum, Holmdel, NJ, September 29, 1998.
333. "Applying Software Design Patterns and Framework to Telecommunication Applications," Nortel Advanced Software Computing and Technology, Monday, April 6, 1998, Ottawa, Canada.
334. "Patterns and Performance of Real-time Object Request Brokers," University of California, Santa Barbara, February 20, 1998.
335. "Principles and Patterns of High-performance, Real-time Object Request Brokers," University of Frankfurt, Germany, February 12th, 1998.
336. "Principles and Patterns of High-performance, Real-time Object Request Brokers," University of Illinois, Urbana-Champaign November 12th, 1997.
337. "Principles and Patterns of High-performance, Real-time Object Request Brokers," University of Missouri, Kansas City, October 31st, 1997.
338. "Principles and Patterns of High-performance, Real-time Object Request Brokers," IBM T.J. Watson Research, September 15, 1997.
339. "Principles and Patterns of High-performance, Real-time Object Request Brokers," University of California, Santa Barbara, August 21st, 1997.
340. "Principles and Patterns of High-performance, Real-time Object Request Brokers," Lucent Technologies, Naperville, IL August 19th, 1997.
341. "Mastering Software Complexity with Reusable Object-Oriented Frameworks, Components, and Design Patterns," 3rd NSA Software Reuse Symposium, August 20th, 1997.
342. "Principles and Patterns of High-performance, Real-time Object Request Brokers," University of Utah, Salt Lake City, Utah, August 11th, 1997.
343. "Using the ACE Framework and Design Patterns to Develop Object-Oriented Communication Software," CERN, Switzerland, July 18th, 1997.
344. "Principles and Patterns of High-performance, Real-time Object Request Brokers," CHOOSE symposium, Zurich, Switzerland, July 17th, 1997.
345. Invited keynote speaker for 2<sup>nd</sup> Component's User Conference, Munich Germany, July 1997.
346. "Principles and Patterns of High-performance, Real-time Object Request Brokers," Lucent Bell Laboratories, Murray Hill, New Jersey, July 9th, 1997.

347. "Using the ACE Framework and Design Patterns to Develop Object-Oriented Communication Software," Lockheed Martin Tactical Systems, Minneapolis, Minnesota, June 26th, 1997.
348. "QoS for Distributed Object Computing Middleware – Fact or Fiction?" panel at the Fifth International Workshop on Quality of Service (IWQoS '97), May 22nd, 1997, Columbia University, NYC, USA.
349. "Design Patterns and Frameworks for Developing Object-oriented WWW Clients and Servers," Carleton University, April 11th, 1997.
350. "Principles and Patterns of High-performance, Real-time Object Request Brokers," University of Maryland, College Park, Maryland, April 2nd, 1997.
351. "A High-Performance End system Architecture for Real Time COBRA," SPARTAN Symposium sponsored by US Sprint, Lawrence Kansas, March 18th, 1997.
352. "Experience with CORBA for Communication Systems," Motorola, Chicago, January 24th, 1997.
353. "High-performance CORBA," Bay Area Object Interest Group, Stanford Linear Accelerator Center, California, December 5th, 1996.
354. "Gigabit CORBA – An Architecture for High-performance Distributed Object Computing," Numerical Aerodynamic Simulation group, NASA, Moffett Field, California, December 3rd, 1996.
355. "Towards High-performance, Real-time CORBA," Distinguished Lecturer at Kansas State University, Manhattan, Kansas, November 7th, 1996.
356. "Gigabit CORBA – An Architecture for High-performance Distributed Object Computing," University of California, Los Angeles, October 3rd, 1996.
357. "Design Patterns and Frameworks for Object-Oriented Communication Software," NSA Software Reuse Symposium, August 28th, 1996.
358. "CORBA – the Good, the Bad, and the Ugly," Lucent Bell-Labs, Naperville, IL, August 22nd, 1996.
359. "Components: the Good, the Bad, and the Ugly," keynote talk for the 1st Components Users Conference, SIEMENS, Munich, Germany, July 15th, 1996.
360. "Design Patterns for Object-Oriented Communication Software," IONA Technologies, Ltd, Dublin, Ireland, July 12th, 1996.
361. "OO Design Patterns and Frameworks for Communication Software," Siemens Corporate Research, Princeton, New Jersey, June 27, 1996.
362. "OO Design Patterns for Concurrent, Parallel, and Distributed Systems," IBM Centre for Advanced Studies, North York, Ontario, Canada, June 17, 1996.
363. "Distributed Object Computing with CORBA", Bell Laboratories, Murray Hill, New Jersey, June 11-12th, 1996.
364. "Design Patterns for Object-Oriented Communication Software," Carleton University, Ottawa, Canada, May 21st, 1996.
365. "Integrating LAN-WAN-Celestial Networks with Design Patterns," Featured technical session at the Object World East conference, Boston, MA, May 9th, 1996.
366. "Using Design Patterns to Develop Object-Oriented Communication Software Frameworks and Applications," McMaster's University, Hamilton, Canada, May 2nd, 1996.
367. "Towards Gigabit CORBA – A High-Performance Architecture for Distributed Object Computing," University of Nevada, Reno, April 25th, 1996.
368. "Domain Analysis: From Tar Pit Extraction to Object Mania?" Panelist at the 4th International Conference on Software Reuse, Orlando, Florida, April 25<sup>th</sup>, 1996. (other panelists include Spencer Peterson, SEI CMU, Mark Simos, Organon Motives Inc., Will Tracz, Loral, and Nathan Zalman, BNR Inc).
369. "Concurrent Object-Oriented Network Programming with C++," Kodak Imaging Technology Center, April 19<sup>th</sup>, 1996.
370. "Using OO Design Patterns and Frameworks to Develop Object-Oriented Communication Systems," INRS/NorTel Workshop on Telecommunication Software, Montreal, CA, March 14<sup>th</sup>, 1996.

371. "Concurrent Object-Oriented Network Programming with ACE and C++," for Siemens Medical Engineering, Erlangen Germany, February 15<sup>th</sup>, 1996.
372. "OO Componentware" Panelist at the *OOP '96 Conference*, SIGS, Munich, Germany, February 13<sup>st</sup>, 1996. (other panelists included Michael Stal (Siemens AG) and Frank Buschmann (Siemens AG).
373. "Using Design Patterns to Develop High-performance Object-Oriented Communication Software Frameworks," for the Department of Information Systems, Institute of Computer Science, Johannes Kepler University of Linz, Austria, February 12<sup>th</sup>, 1996.
374. "The Performance of Object-Oriented Components for High-speed Network Programming," for the Digital Libraries research group at Stanford University, Palo Alto California, February 2<sup>nd</sup>, 1996.
375. "Distributed Object Computing with CORBA, ACE, and C++," for Southwestern Bell Telephone advanced distributed systems group, St. Louis, MO., January 26<sup>th</sup>, 1996.
376. "OO Design Patterns for Large-Scale Object-Oriented Communication Software Systems," AG Communication Systems, Phoenix, Arizona, December 11 –13<sup>th</sup>, 1995.
377. "Experience Using OO Design Patterns to Develop Large-Scale Object-Oriented Communication Software Systems," Bell Northern Research, 7th Annual Design Forum, Ottawa, Canada, December 6<sup>th</sup>, 1995.
378. "Using OO Design Patterns to Develop Large-Scale Distributed Systems," Object Technology International, Ottawa, Canada, November 22<sup>nd</sup>, 1995.
379. "Design Patterns for Concurrent, Parallel, and Distributed Systems," North Dallas Society for Object Technology, September 13<sup>th</sup>, 1995.
380. "Using Design Patterns for Iridium Communication Services," at Motorola Iridium, Chandler, AZ, June 30<sup>th</sup>, 1995.
381. "Object Technology and the World-Wide Information Infrastructure," Panelist at ECOOP '95, Aarhus, Denmark, August 9<sup>th</sup>, 1995.
382. "Measuring the Performance of CORBA over ATM Networks," HP Labs, Palo Alto, CA, June 28<sup>th</sup>, 1995.
383. "Measuring the Performance of Object-Oriented Components for High-speed Network Programming," The C++ and C SIG user group, New York, New York, June 5<sup>th</sup>, 1995.
384. "An Overview of Design Patterns for Object-Oriented Network Programming," St. Louis Chapter of the ACM, St. Louis, MO, March 13<sup>th</sup> 1995.
385. "Design Patterns for Concurrent Object-Oriented Network Programming," Distributed Systems group at Siemens Corporate Research Center, Munich, Germany, March 3<sup>rd</sup>, 1995.
386. "Patterns: 'Eureka,' 'Deja-Vu,' or 'Just Say No'?" Panelist at the *OOP '95 Conference*, SIGS, Munich, Germany January 31<sup>st</sup>, 1995. (other panelists included Richard Helm, (DMR), Frank Buschmann (Siemens AG), and Dave Thomas (OTI).
387. "Developing Distributed Applications with the ADAPTIVE Communication Environment," *The 12<sup>th</sup> Annual Sun Users Group Conference*, SUG, San Francisco, California, June 17<sup>th</sup>, 1994.
388. "Flexible Configuration of High-performance Distributed Communication Systems," presented at the ETH-Zentrum in the Swiss Federal Institute of Technology, Zurich, Switzerland, May 31<sup>st</sup>, 1994.
389. "Object Oriented Techniques for Developing Distributed Applications," *Computer Science Department Colloquia*, California State University Northridge, December 7<sup>th</sup>, 1993.
390. "Hosting the ADAPTIVE System in the x-Kernel and System V STREAMS," *The x-Kernel Workshop*, IEEE, Tucson, Arizona, November 10<sup>th</sup>, 1992.
391. "An Environment for Controlled Experimentation on the Performance Effects of Alternative Transport System Designs and Implementations," IBM T. J. Watson Research Center, Hawthorne, New York, September 10<sup>th</sup>, 1992.

### Colloquia, Seminars, and Tutorials

1. "Programming with Java Lambdas and Streams," O'Reilly Live Training, May 3<sup>rd</sup>, 2022.
2. "Design Patterns in Java," O'Reilly Live Training, April 28<sup>th</sup> and 29<sup>th</sup>, 2022.
3. "Scalable Reactive Programming with Java," O'Reilly Live Training, February 2<sup>nd</sup>, 2022.
4. "Programming with Java Lambdas and Streams," O'Reilly Live Training, December 6<sup>th</sup>, 2021.
5. "Design Patterns in Java," O'Reilly Live Training, November 15<sup>th</sup> and 16<sup>th</sup>, 2021.
6. "Scalable Reactive Programming with Java," O'Reilly Live Training, September 9<sup>th</sup>, 2021.
7. "Design Patterns in Java," O'Reilly Live Training, September 1<sup>st</sup> and 2<sup>nd</sup>, 2021.
8. "Programming with Java Lambdas and Streams," O'Reilly Live Training, July 20<sup>th</sup>, 2021.
9. "Scalable Reactive Programming with Java," O'Reilly Live Training, May 17<sup>th</sup>, 2021.
10. "Scalable Reactive Programming with Java," O'Reilly Live Training, January 22<sup>nd</sup>, 2021.
11. "Programming with Java Lambdas and Streams," O'Reilly Live Training, January 13<sup>th</sup>, 2021.
12. "Design Patterns in Java," O'Reilly Live Training, November 12<sup>th</sup> and 13<sup>th</sup>, 2020.
13. "Design Patterns in Java," O'Reilly Live Training, September 17<sup>th</sup> and 18<sup>th</sup>, 2020.
14. "Programming with Java Lambdas and Streams," O'Reilly Live Training, September 14<sup>th</sup>, 2020.
15. "Core Java Synchronizers," O'Reilly Live Training, August 20<sup>th</sup>, 2020.
16. "Scalable Reactive Programming with Java," O'Reilly Live Training, August 19<sup>th</sup>, 2020.
17. "Programming with Java Lambdas and Streams," O'Reilly Live Training, June 1<sup>st</sup>, 2020.
18. "Design Patterns in Java," O'Reilly Live Training, May 27<sup>th</sup> and 28<sup>th</sup>, 2020.
19. "Core Java Synchronizers," O'Reilly Live Training, May 18<sup>th</sup>, 2020.
20. "Programming with Java Lambdas and Streams," O'Reilly Live Training, March 30<sup>th</sup>, 2020.
21. "Design Patterns in Java," O'Reilly Live Training, March 23<sup>rd</sup> and 24<sup>th</sup>, 2020.
22. "Scalable Concurrency with the Java Executor Framework," O'Reilly Live Training, February 24<sup>th</sup>, 2020.
23. "Core Java Synchronizers," O'Reilly Live Training, February 10<sup>th</sup>, 2020.
24. "Design Patterns in Java," O'Reilly Live Training, January 29<sup>th</sup> and 30<sup>th</sup>, 2020.
25. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, January 22<sup>nd</sup>, 2020.
26. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, January 22<sup>nd</sup>, 2020.
27. "Scalable Concurrency with the Java Executor Framework," O'Reilly Live Training, November 27<sup>th</sup>, 2019.
28. "Reactive Programming with Java 8 CompletableFutures," O'Reilly Live Training, November 18<sup>th</sup>, 2019.
29. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, November 6<sup>th</sup>, 2019.
30. "Design Patterns in Java," O'Reilly Live Training, November 4<sup>th</sup> and 5<sup>th</sup>, 2019.
31. "Design Patterns in Java," O'Reilly Live Training, September 17<sup>th</sup> and 18<sup>th</sup>, 2019.
32. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, September 3<sup>rd</sup>, 2019.
33. "Scalable Concurrency with the Java Executor Framework," O'Reilly Live Training, August 29<sup>th</sup>, 2019.
34. "Reactive Programming with Java 8 CompletableFutures," O'Reilly Live Training, August 15<sup>th</sup>, 2019.
35. "Design Patterns in Java," O'Reilly Live Training, July 29<sup>th</sup> and 30<sup>th</sup>, 2019.
36. "Reactive Programming with Java 8 CompletableFutures," O'Reilly Live Training, August 15<sup>th</sup>, 2019.
37. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, July 2<sup>nd</sup>, 2019.

38. "Design Patterns in Java," O'Reilly Live Training, June 13th and 14th, 2019.
39. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, May 16th, 2019.
40. "Reactive Programming with Java 8 CompletableFutures," O'Reilly Live Training, May 13th, 2019.
41. "Design Patterns in Java," O'Reilly Live Training, April 17th and 18th, 2019.
42. "Scalable Programming with Java 8 Parallel Streams," O'Reilly Live Training, March 27th, 2019.
43. "Scalable Concurrency with the Java Executor Framework," O'Reilly Live Training, March 12th, 2019.
44. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, March 5th, 2019.
45. "Design Patterns in Java," O'Reilly Live Training, February 26th and 27th, 2019.
46. "Reactive Programming with Java 8 CompletableFutures," O'Reilly Live Training, February 19th, 2019.
47. "Scalable Concurrency with the Java Executor Framework," O'Reilly Live Training, February 5th, 2019.
48. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, January 22nd, 2019.
49. "Design Patterns in Java," O'Reilly Live Training, January 7th and 8th, 2019.
50. "Scalable Concurrency with the Java Executor Framework," O'Reilly Live Training, December 11th, 2018.
51. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, December 6th, 2018.
52. "Design Patterns in Java," O'Reilly Live Training, November 13th and 14th, 2018.
53. "Scalable Concurrency with the Java Executor Framework," O'Reilly Live Training, October 29th, 2018.
54. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, October 16th, 2018.
55. "Reactive Programming with Java 8 CompletableFutures," O'Reilly Live Training, October 4th, 2018.
56. "Design Patterns in Java," O'Reilly Live Training, September 18th and 19th, 2018.
57. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, September 4th, 2018.
58. "Reactive Programming with Java 8 CompletableFutures," O'Reilly Live Training, August 30th, 2018.
59. "Scalable Programming with Java 8 Parallel Streams," O'Reilly Live Training, August 20th, 2018.
60. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, July 25th, 2018.
61. "Design Patterns in Java," O'Reilly Live Training, July 2nd and 3rd, 2018.
62. "Reactive Programming with Java 8 CompletableFutures," O'Reilly Live Training, June 26th, 2018.
63. "Scalable Programming with Java 8 Parallel Streams," O'Reilly Live Training, June 25th, 2018.
64. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, June 8th, 2018.
65. "Design Patterns in Java," O'Reilly Live Training, May 24th and 25th, 2018.
66. "Reactive Programming with Java 8 CompletableFutures," O'Reilly Live Training, April 26th, 2018.
67. "Scalable Programming with Java 8 Parallel Streams," O'Reilly Live Training, April 17th, 2018.
68. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, April 13th, 2018.
69. "Design Patterns in Java," O'Reilly Live Training, April 3rd, 2018.
70. "Reactive Programming with Java 8 CompletableFutures," O'Reilly Live Training, March 13th, 2018.
71. "Scalable Programming with Java 8 Parallel Streams: Part 2," O'Reilly Live Training, March 7th, 2018.

72. "Scalable Programming with Java 8 Parallel Streams: Part 1," O'Reilly Live Training, March 6th, 2018.
73. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, March 1st, 2018.
74. "Reactive Programming with Java 8 CompletableFutures," O'Reilly Live Training, February 13th, 2018.
75. "Scalable Programming with Java 8 Parallel Streams," O'Reilly Live Training, February 6th, 2018.
76. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, February 1st, 2018.
77. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, January 12th, 2018.
78. "Scalable Programming with Java 8 Parallel Streams," O'Reilly Live Training, January 10th, 2018.
79. "Reactive Programming with Java 8 CompletableFutures," O'Reilly Live Training, January 9th, 2018.
80. "Reactive Programming with Java 8 Completable Futures," O'Reilly Live Training, October 23rd, 2017.
81. "Programming with Java 8 Lambdas and Streams," O'Reilly Live Training, October 19th, 2017.
82. "Scalable Programming with Java 8 Parallel Streams," O'Reilly Live Training, October 17th, 2017.
83. "Java 8 Concurrency," O'Reilly Live Training, September 7-8th, 2017.
84. "Java 8 Concurrency," O'Reilly Live Training, August 30-31st, 2017.
85. "Java 8 Concurrency," O'Reilly Live Training, June 28-29th, 2017.
86. "The C++ Standard Template Library," Qualcomm, San Diego, February 16-19, 2016.
87. "The C++ Standard Template Library," Qualcomm, San Diego, October 13-16, 2015.
88. "The C++ Standard Template Library," Qualcomm, San Diego, October 13-16, 2015.
89. "Pattern-Oriented Java Concurrency," InformIT Webinar, May 14th, 2015.
90. "Pattern-Oriented Concurrent Programming with Java," OOP Conference, Munich, Germany, January 30th, 2015.
91. "Concurrent Programming in Android," OOP Conference, Munich, Germany, January 29th, 2015.
92. "The C++ Standard Template Library," Qualcomm, San Diego, October 14-17, 2014.
93. "The C++ Standard Template Library," Qualcomm, San Diego, August 5-8, 2014.
94. "Pattern-Oriented Software Architecture for Concurrent and Networked Software," July 28-31, 2014.
95. "The C++ Standard Template Library," Qualcomm, San Diego, August 5-8, 2014.
96. "The C++ Standard Template Library," Qualcomm, India, March, 2014.
97. "The C++ Standard Template Library," Qualcomm, San Diego, CA, January 23-34, 2014.
98. "The C++ Standard Template Library," Qualcomm, San Diego, CA, October 16-17th, 2013.
99. "Patterns and Frameworks for Concurrent and Networked Software," 2013 International Summer School on Trends in Computing Tarragona, Spain, July 25-26, 2013.
100. "The C++ Standard Template Library," Qualcomm, San Diego, CA, January 23-24th, 2013.
101. "The C++ Standard Template Library," Qualcomm, San Diego, CA, October 4-5th, 2012.
102. "Embedded Systems Patterns for C Developers," Qualcomm, San Diego, CA, August 28th, September 11th, September 25th, October 9th, October 23rd, and November 6th, 2012.
103. "Embedded Systems Patterns for C Developers," Qualcomm, San Diego, CA, August 14-15th, 2012.
104. "The C++ Standard Template Library," Qualcomm, San Diego, CA, May 15-18th, 2012.
105. "The C++ Standard Template Library," Qualcomm, San Diego, CA, January 25-26th, 2012.
106. "Object-Oriented Software Patterns and Frameworks," Qualcomm, San Diego, CA, October 11-

- 12th, 2011.
107. "The C++ Standard Template Library," Qualcomm, San Diego, CA, May 11-12th, 2011.
  108. "The C++ Standard Template Library," Qualcomm, San Diego, CA, January 25-26, 2011.
  109. "Pattern-Oriented Software Architecture: A Pattern Language for Concurrent and Networked Software," SPLASH 2010, October 17-21, 2010, Reno, Nevada.
  110. "Pattern-Oriented Software Architectures - Patterns and Frameworks for Concurrent and Networked Software," ProObject, Hanover, MD, August 11th, 2010.
  111. "Pattern-Oriented Software Architecture: Patterns for Concurrent and Networked Embedded Systems," Qualcomm, Bangalore, India, June 21-22, 2010.
  112. "Pattern-Oriented Software Architecture: Patterns for Concurrent and Networked Embedded Systems," Qualcomm, Hyderabad, India, June 24-25, 2010.
  113. "Pattern-Oriented Software Architecture: A Pattern Language for High Quality and Affordable Distributed Computing Systems," IEEE Webinar Series, June 10th, 2010.
  114. "The C++ Standard Template Library," Qualcomm, San Diego, CA, May 12-13, 2010.
  115. "The C++ Standard Template Library," Qualcomm, San Diego, CA, December 16-17, 2009.
  116. "Pattern-Oriented Software Architecture: A Pattern Language for Distributed Computing," OOPSLA 2009, Orlando, FL, October, 2009.
  117. "The C++ Standard Template Library," Qualcomm, San Diego, CA, September 15-16, 2009.
  118. "Networked Embedded Systems Patterns for C Developers," Qualcomm, San Diego, CA, June 11-12, 2009.
  119. "Pattern-Oriented Software Architecture: A Pattern Language for Distributed Computing," Software Architecture Technology Users' Network (SATURN) workshop May 5, 2009 in Pittsburgh, PA.
  120. "The C++ Standard Template Library," Qualcomm, San Diego, CA, January 29-30, 2009.
  121. "Pattern-Oriented Software Architecture: A Pattern Language for Distributed Computing," IEEE Webinar Series, January 8th, 2009.
  122. "Pattern-Oriented Software Architecture: A Pattern Language for Distributed Computing," OOPSLA 2008, Nashville, TN, October 20, 2008.
  123. "The Data Distribution Service for Real-time Systems," OOPSLA 2008, Nashville, TN, October 19, 2008.
  124. "Object-Oriented Patterns for Concurrent and Networked Applications," Qualcomm, San Diego, CA, August 5-6th, 2008.
  125. "The C++ Standard Template Library," Qualcomm, San Diego, NJ, July 29-30, 2008.
  126. "Object-Oriented Patterns and Frameworks with C++," Qualcomm, San Diego, CA, June 12-13, 2008.
  127. "The C++ Standard Template Library," Qualcomm, New Jersey, May 5-6, 2008.
  128. "Pattern-Oriented Software Architecture: A Pattern Language for Distributed Computing," Software Architecture Technology Users' Network (SATURN) workshop April 28 - May 1, 2008 in Pittsburgh, PA.
  129. Developing Distributed Computing Systems with Patterns and Middleware, UCLA Extension, February 19-21, 2008.
  130. Pattern-Oriented Software Architecture: A Pattern Language for Distributed Computing, OOPSLA 2007, Montreal, CA, October 24, 2007.
  131. Object-Oriented Design and Programming with Patterns, Frameworks, and Middleware, Qualcomm, New Jersey, September 27-28, 2007.
  132. Object-Oriented Design and Programming with Patterns, Frameworks, and Middleware, Qualcomm, San Diego, CA, August 21-22, 2007.

133. Lightweight CORBA Component Model, 8th OMG Real-time/Embedded CORBA workshop, Washington DC, July 9–12, 2007.
134. Model-Driven Engineering for Distributed Real-time and Embedded Systems, 13th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS 2007), Bellevue, WA, United States April 3-6, 2007.
135. “Improving Product Reliability and ROI Through Effective Software Reuse,” Qualcomm, San Diego, CA, March 27th, 2007.
136. “Developing Distributed Computing Systems with Patterns and Middleware,” UCLA Extension, February 21-23, 2007.
137. “POSA: Patterns for Concurrent and Distributed Systems,” OOP, Munich, Germany, January 22, 2007.
138. “Meeting the Challenges of Software-Intensive Embedded Systems,” OOP, Munich, Germany, January 23, 2007.
139. “Object-Oriented Design and Programming with Patterns, Frameworks, and Middleware,” Qualcomm, San Diego, CA, January 10-11, 2007.
140. “Model-Driven Development of Distributed Systems,” OOPSLA 2006, Portland, OR, October 22- 26, 2006.
141. “Pattern-Oriented Software Architecture: Patterns for Concurrent and Networked Objects,” OOP- SLA 2006, Portland, OR, October 22-26, 2006.
142. “Model-Driven Engineering of Distributed Systems,” MODELS 2006, Genova, Italy, October 1, 2006.
143. “Distributed Real-time and Embedded Systems,” Advanced Institute of Information Technology, Seoul, Korea, August 7-11 2006.
144. “Lightweight CORBA Component Model,” 7th OMG Real-time/Embedded CORBA workshop, Washington DC, July 10–13, 2006.
145. “How to Use ACE Effectively,” Trion World Network, Austin, TX, June 19-21, 2006.
146. “Improving Product Reliability and ROI Through Effective Software Reuse,” Qualcomm, San Diego, CA, June 15, 2006.
147. “Object-Oriented Design and Programming with Patterns, Frameworks, and Middleware,” Qualcomm, San Diego, CA, June 13-14, 2006.
148. “Object-Oriented Design and Programming with Patterns, Frameworks, and Middleware,” Qualcomm, San Diego, CA, Feb 9-10, 2006.
149. “Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems, University of California, Los Angeles Extension, January 18-20st, 2006.”
150. “Model Driven Development of Distributed Real-time and Embedded Systems,” at the OOP conference, January 17, 2006, Munich, Germany.
151. “Pattern-Oriented Software Architecture,” at the OOP conference, January 16, 2006, Munich, Germany.
152. “Model Driven Development: State of the Art,” at the OOP conference, January 16, 2006, Munich, Germany.
153. “Concurrent C++ Network Programming with Patterns and Frameworks,” C++ Connections: 20 Years of C++ conference, November 11, 2005, Mandalay Bay, Las Vegas, NV.
154. “Pattern-Oriented Software Architecture: Patterns for Concurrent and Distributed Systems,” OOPSLA 2005, San Diego, October 17th, 2005.
155. “Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems,” BAE Systems, Greenlawn, New York, August 25, September 2-3.
156. “Lightweight CORBA Component Model,” 6th OMG Real-time/Embedded CORBA workshop, Washington DC, July 11–14, 2005.
157. “Model Driven Development for Distributed Real-time and Embedded Systems,” OMG Information Days: MDA - Frankfurt, Germany, June 9th, 2005

158. "Model Driven Development for Distributed Real-time and Embedded Systems," OMG Information Days: MDA - Munich, Germany, June 7th, 2005.
159. "Model Driven Development for Distributed Real-time and Embedded Systems," OMG Information Days: MDA - Zurich, Switzerland, June 1st, 2005.
160. Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," BAE Systems, Wayne, New Jersey, May 13, 16, 19, 23, 27, 2005.
161. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," BAE Systems, Wayne, New Jersey, February 18th, February 22nd, March 1, 8, and 15 2005.
162. "Pattern-Oriented Software Architectures for Distributed Systems" the OOP conference, January 28, 2005, Munich, Germany.
163. "Research on Model Driven Development of Distributed Real-time and Embedded Systems," the OOP conference, January 26, 2005, Munich, Germany.
164. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California, Los Angeles Extension, January 19-21st, 2005.
165. atterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems, BAE Systems, Wayne, New Jersey, October 29, November 1, 8, 15, 22, 2004.
166. "Pattern-Oriented Software Architectures for Distributed Systems," OOPSLA 2004, Vancouver, British Columbia, October 25th, 2004.
167. "Notes on the Forgotten Craft of Software Architecture", OOPSLA 2004, Vancouver, British Columbia, October 25th, 2004.
168. "Model Driven Architecture with QoS-enabled component middleware," MDE for Embedded Systems, Brest, France, September 10th 2004.
169. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," Qualcomm, San Diego, CA, Jan 7-6, 2005.
170. "Object-Oriented Design and Programming with Patterns, Frameworks, and Middleware," Qualcomm, San Diego, CA, Jan 9-10, 2005.
171. "Using the Lightweight CORBA Component Model to Develop Distributed Real-time and Embedded Applications," OMG Workshop on Distributed Object Computing for Real-time and Embedded Systems, July 12th, 2004, Reston, VA.
172. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California, Los Angeles Extension, July 7-9th, 2004.
173. Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems, University of California, Los Angeles Extension, January 21st-23rd, 2004.
174. Patterns and Frameworks for Concurrent Distributed Systems, SIGS OOP Conference, Munich, Germany, January 19th, 2004.
175. Middleware for Distributed Real-time and Embedded Systems, SIGS OOP Conference, Munich, Germany, January 19th, 2004.
176. "Pattern-Oriented Software Architectures for Networked and Concurrent Applications," OOPSLA 2003, Anaheim, CA, October 27, 2003.
177. The JAOO 2003 conference, September 22-26, Aarhus, Denmark.
178. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California, Los Angeles Extension, July 9-11th, 2003.
179. "Patterns, Frameworks, and Middleware: Their Synergistic Relationship," Frontiers of Software Practice, International Conference on Software Engineering, Portland, Oregon, May 7, 2003.
180. "Pattern-Oriented Distributed Systems Architecture," International Conference on Software Engineering, Portland, Oregon, May 5, 2003.
181. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California, Los Angeles Extension, January 22nd-24th, 2003.
182. "Patterns and Application Experiences for Real-time Object Request Brokers," OOPSLA 2002, Seat-

- tle, Washington, November, 2002.
183. "Pattern-Oriented Software Architectures for Networked and Concurrent Applications," OOPSLA 2002, Seattle, Washington, November, 2002.
  184. Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems, Raytheon, St. Petersburg, FL, September 3–5, 2003.
  185. Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems, University of California, Los Angeles Extension, July 22nd-24th, 2002.
  186. "Policies and Patterns for High-performance, Real-time Object Request Brokers," Mercury Computer Systems, Tysons Corner, VA, November Feb 7, 2002.
  187. Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems, University of California, Los Angeles Extension, January 23rd-25th, 2002.
  188. "Policies and Patterns for High-performance, Real-time Object Request Brokers," Raytheon, Rosslyn, VA, November 12th, 2001.
  189. "Pattern-Oriented Software Architecture: Patterns for Concurrent and Networked Objects," OOP- SLA 2001, October 15th, 2000, Minneapolis, Minnesota.
  190. "Policies and Patterns for High-performance, Real-time Object Request Brokers," International Symposium on Distributed Object Applications (DOA), Rome, September 17-20, 2001.
  191. "Policies and Patterns for QoS-enabled Middleware," The JAOO 2001 conference, September 10-14, Aarhus, Denmark.
  192. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California, Los Angeles Extension, July 23rd-25th, 2001.
  193. "Policies and Patterns for High-performance, Real-time Object Request Brokers," OMG Second Workshop on Real-time and Embedded Distributed Object Computing on June 4-7, 2001 in Herndon, VA, USA.
  194. "Design Patterns for Understanding Middleware and Component Infrastructures," 6th USENIX Conference on Object-Oriented Technologies and Systems, January 29, 2001, San Antonio, TX.
  195. "Principles and Patterns of High-performance, Real-time Object Request Brokers," OOP conference, Munich, Germany, January 23, 2001.
  196. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California, Los Angeles Extension, January 3-5, 2001.
  197. "Patterns for Concurrent and Distributed Objects," OOPSLA 2000, October 16th, 2000, Minneapolis, Minnesota.
  198. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California, Berkeley Extension, May 24-26, 2000.
  199. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," Jet Propulsion Laboratory, Pasadena, CA, April 2000.
  200. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California, Los Angeles Extension, March 27-31, 2000.
  201. "Optimizing Middleware to Support High-Performance Real-time Distributed and Embedded Systems," OOP conference, Munich, Germany, January 27, 2000.
  202. "Effective Architectures for DOC," OOP conference, Munich, Germany, January 24, 2000.
  203. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California, Berkeley Extension, December 13-15, 1999.
  204. "Middleware Techniques and Optimizations for Real-time Embedded Systems," 12th International Symposium On System Synthesis, IEEE, San Jose, CA, USA, November 11, 1999
  205. "Patterns and Principles of Real-time Object Request Brokers," OOPSLA 1999, ACM, Denver, Colorado, November 1-5, 1999.
  206. "Using Design Patterns, Frameworks and CORBA to Reduce the Complexity of Developing Reusable Large-Scale Object-Oriented Concurrent Communication Components and Systems," Fifth IEEE

- International Conference on Engineering of Complex Computer Systems, Las Vegas, Nevada, October 18-21, 1999
207. "Distributed Technologies," Motorola, Schaumburg, IL, August 10-12, 1999.
  208. "Patterns and Principles of Real-time Object Request Brokers," the 3rd Components Users Conference, SIEMENS, Munich, Germany, July 12th, 1999.
  209. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," Lucent, Naperville, IL, June 23-24 and June 30 - July 1st, 1999.
  210. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," Motorola Software Symposium, Ft. Lauderdale, Florida, June 21st, 1999.
  211. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California Los Angeles Extension, June 2-4, 1999.
  212. "Concurrent Object-Oriented Network Programming and Distributed Object Computing," University of California Berkeley Extension, May 19-21, 1999.
  213. "Patterns and Principles of Real-time Object Request Brokers," 5th USENIX Conference on Object-Oriented Technologies and Systems, May 4, 1999, San Diego, CA.
  214. "Real-time CORBA for Telecom – Fact or Fiction?" Nortel Design Forum, Ottawa, CA, April 22, 1999.
  215. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," Lucent, Columbus, OH, March 18-19 and 25-26, 1999.
  216. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," Lucent, Holmdel, NJ, March 1-4, 1999.
  217. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," Lucent/Octel, Milpitas, CA, December 14-16, 1998.
  218. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California Los Angeles Extension, December 8-10, 1998.
  219. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," Motorola, Schaumburg, IL, December 2-4, 1998.
  220. "Concurrent Object-Oriented Network Programming and Distributed Object Computing," University of California Berkeley Extension, November 16-18, 1998.
  221. "Using Design Patterns and Frameworks to Develop Object-Oriented Communication Software," OOPSLA 1998, October 19th, 1998, Vancouver, British Columbia.
  222. "High-Performance CORBA," Lucent CORBA Forum, Holmdel, NJ, September 29, 1998.
  223. "Writing Efficient Multi-Thread CORBA Applications," the 3rd Components Users Conference, SIEMENS, Munich, Germany, July 10, 1998.
  224. "Using Design Patterns and Frameworks to Develop Object-Oriented Communication Software," UCLA extension course, Milan, Italy, June 29 - July 1, 1998.
  225. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," Lucent, Naperville, IL, June 8-11, 1998.
  226. "Patterns and Performance of Real-time Object Request Brokers," Fourth IEEE Real-Time Technology and Applications Symposium (RTAS), Denver, Colorado, June 5, 1998.
  227. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California Los Angeles Extension, June 1-3, 1998.
  228. "Patterns and Principles of Real-time Object Request Brokers," NSA, Ft. Meade, MD, March 22, 1998.
  229. Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems, Crosskeys, Ottawa Canada, March 19-21, 1998.
  230. "Concurrent Object-Oriented Network Programming and Distributed Object Computing," University of California Berkeley Extension, March 4-6, 1998.
  231. "Building Distributed Communication Software with CORBA," the Motorola Systems Symposium,

February, 1998, Austin, Texas, USA.

232. "Introduction to Distributed Objects with CORBA," SIGS OOP '98, February 9-13, 1998, Munich, Germany.
233. "Design Patterns for Developing and Using CORBA Object Request Brokers," SIGS OOP '98, February 9-13, 1998, Munich, Germany.
234. Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems, Lucent Technologies, Whippany, NJ, January 5-6, 1998.
235. "Using Design Patterns, Frameworks, and CORBA to Develop Object-Oriented Communication Systems," University of California Los Angeles Extension, December 10-12, 1997.
236. "Concurrent Object-Oriented Network Programming and Distributed Object Computing," University of California Berkeley Extension, December 10-12, 1997.
237. "Using Design Patterns and Frameworks to Develop Object-Oriented Communication Systems," Motorola Cellular Infrastructure Group, Arlington Heights, Illinois, December 1 - 3, 1997.
238. "Using Design Patterns and Frameworks to Develop Object-Oriented Communication Systems," TOOLS Pacific '97, Melbourne, Australia November 24 - 27, 1997.
239. "Using Design Patterns and Frameworks to Develop Object-Oriented Communication Systems" for the IEEE GLOBECOM '97 conference, Phoenix, AZ, November 4-8, 1997.
240. "High-performance Distributed Object Computing with CORBA," IEEE International Conference on Network Protocols, Atlanta, GA, October 28th, 1997.
241. "Using Design Patterns and Frameworks to Develop Object-Oriented Communication Systems," OOPSLA 1997, ACM, Atlanta, GA, October 6-7th, 1997.
242. "Using Design Patterns and Frameworks to Develop Object-oriented Communication Systems," 24th International Conference on Technology of Object-Oriented Languages and Systems (TOOLS Asia '97). Beijing, China, September 22, 1997.
243. "Principles and Patterns of Distributed Object Computing Systems," for the ACM Principles of Distributed Computing Conference (PODC), Santa Barbara, CA, August 21st, 1997.
244. "Distributed Object Computing with CORBA and ACE," Alta Software, Jacksonville, FL, June 4-5th, 1997.
245. "Distributed Object Computing with CORBA", Object Expo, NY, NY, June 2nd, 1997.
246. "Concurrent Object-Oriented Network Programming and Distributed Object Computing," University of California Berkeley Extension, May 28-30, 1997.
247. "Patterns and Principles of Real-time Object Request Brokers," National Security Agency, Ft. Meade, MD, May 13th, 1997.
248. "Building Distributed Communication Software with CORBA," the Motorola Systems Symposium, March, 1997, Chandler, AZ, USA.
249. "Evaluating Concurrency Models for CORBA Servers," the 2nd Components Users Conference, SIEMENS, Munich, Germany, July 14th, 1997.
250. "Design Patterns for Evolving System Software Components from UNIX to Windows NT," the 2st Components Users Conference, SIEMENS, Munich, Germany, July 14th, 1997.
251. "Techniques and Patterns for Distributed Object Computing with CORBA and C++," University of California Berkeley Extension, December 4-6, 1996.
252. "Design Patterns for Concurrent Object-Oriented Programming with ACE and C++," C++ World, Dallas, TX, November 11th, 1996.
253. "Implementing Concurrent CORBA Applications with Multi-Threaded Orbix and ACE," C++ World, Dallas, TX, November 12th, 1996.
254. "Why Reuse has Failed, and How You Can Make it Work for You," Berne Technology Forum 1996, Berne, Switzerland, October 18, 1996.
255. "Introduction to Distributed Object Programming with CORBA," the Local Computer Networks '96 conference, IEEE, Minneapolis, Minnesota, October 13, 1996.

256. "Object-Oriented Design Patterns for Concurrent, Parallel, and Distributed Systems," the OOPSLA 1996 conference, ACM, San Jose, California, October, 1996.
257. "OO Design Patterns Network Programming in C++," Object Expo Europe, London, England, September 23rd, 1996.
258. "Effective Multithreaded CORBA Programming," Object Expo Europe, London, England, September 24th, 1996.
259. "Workshop on Object Oriented Technologies," Mitsubishi, July 22nd to July 26th, 1996, Kobe, Japan.
260. "Evaluating Concurrency Models for CORBA Servers," the 1st Components Users Conference, SIEMENS, Munich, Germany, July 15th, 1996.
261. "Design Patterns for Evolving System Software Components from UNIX to Windows NT," the 1st Components Users Conference, SIEMENS, Munich, Germany, July 15th, 1996.
262. "OO Design Patterns for Concurrent, Parallel, and Distributed Systems," the 2<sup>nd</sup> Conference on Object-Oriented Technology, USENIX, Toronto, Canada, June 17, 1996.
263. "OO Design Patterns for Concurrent, Parallel, and Distributed Systems," the 3<sup>rd</sup> Conference on Object-Oriented Technology, USENIX, Portland, Oregon, June 16th, 1996.
264. "OO Design Patterns for Network Programming in C++," the Object Expo '96 Conference, SIGS, Sydney, Australia, June 3<sup>rd</sup>, 1996.
265. "Effective Multi-threaded CORBA Programming," the Object Expo '96 Conference, SIGS, Sydney, Australia, June 5<sup>th</sup>, 1996.
266. "Concurrent Object-oriented Network Programming with C++," University Of California Berkeley Extension, Berkeley, California, May 22<sup>nd</sup>–24<sup>th</sup>, 1996.
267. "Experience Developing Reusable Software Using Object-Oriented Design Patterns and Frameworks," the 4<sup>th</sup> International Conference on Software Reuse, Orlando, Florida, USA April 23-26, 1996.
268. "Techniques for Object-Oriented Network Programming," the OOP Conference, SIGS, Munich, Germany, Feb 14th, 1996.
269. "Using Object-Oriented Design Patterns to Develop Large-Scale Distributed Systems," the OOP Conference, SIGS, Munich, Germany, Feb 13<sup>th</sup>, 1996.
270. "Concurrent Object-oriented Network Programming with C++," University Of California Berkeley Extension, Berkeley, California, November 30th-December 1st, 1995.
271. "Using Object-Oriented Design Patterns to Develop Large-Scale Distributed Systems," the 4<sup>th</sup> C++ World Conference, SIGS, Chicago, Illinois, October 31st, 1995.
272. "Techniques for Object-Oriented Network Programming," the 4<sup>th</sup> C++ World Conference, SIGS, Chicago, Illinois, October 31st, 1995.
273. "Experience using OO Design Patterns to Develop Large-scale Distributed Communication Systems," OOPSLA 1995 Conference in Austin, Texas, October 1995.
274. "Concurrent Object-oriented Network Programming with C++," the 9<sup>th</sup> European Conference on Object-Oriented Programming (ECOOP), Aarhus, Denmark, August, 1995.
275. "Concurrent Object-Oriented Network Programming with C++," the 1<sup>st</sup> Conference on Object-Oriented Technology, USENIX, Monterey, California, June 23, 1995.
276. "Design Patterns for Concurrent and Distributed Systems," the Object Expo '95 Conference, SIGS, New York, NY, June 5<sup>th</sup> 1995.
277. "Object Oriented Network Programming," the Object Expo '95 Conference, SIGS, New York, NY, June 5<sup>th</sup>, 1995.
278. "Software Construction with Active Objects in C++," the OOP '95 Conference, SIGS, Munich, Germany January 31, 1995.
279. "Object-Oriented Concurrent Programming with C++," the OOP '95 Conference, SIGS, Munich, Germany January 31, 1995.

280. "Concurrent Object-Oriented Programming," the *Winter USENIX Conference*, USENIX, New Orleans, Louisiana, January, 1995.
281. "Object-Oriented Network Programming with C++," the *3<sup>rd</sup> C++ World Conference*, SIGS, Austin, Texas, November 14, 1994.
282. "Object-Oriented Techniques for Dynamically Configuring Concurrent Distributed Applications," the *9<sup>th</sup> OOPSLA 1994*, ACM, Portland, Oregon, October 23, 1994.
283. "Object-Oriented Network Programming," the *6<sup>th</sup> C++ Conference*, USENIX, Cambridge, Massachusetts, April 11, 1994.
284. "Object-Oriented Techniques for Developing Extensible Network Servers," the *2<sup>nd</sup> C++ World Conference*, SIGS, Dallas, Texas, October 19, 1993.

## Professional Activities

### Editorial Activities

1. Guest co-editor for a special issue of the Springer Journal Annals of Telecommunications on "Middleware for Internet distribution in the context of Cloud Computing and the Internet of Things," 2016, with Gordon Blair and Chantal Taconet.
2. Guest co-editor of the Proceedings of the IEEE special issue on Applications of Augmented Reality Environments, 2014.
3. Guest co-editor of the International Journal of Network Protocols and Algorithms (NPA) Special Issue on Data Dissemination for Large scale Complex Critical Infrastructures, 2010.
4. Wrote the foreword to the book *Patterns of Parallel Software Design* by Jorge Luis Ortega Arjona, Wiley, 2010.
5. Editorial board member of the Springer Journal of Internet Services and Applications (JISA).
6. Editorial board member of the Transactions on Pattern Languages of Programming (TPLoP) published by Springer-Verlag.
7. Wrote the foreword to the book *Practical Software Factories in .NET*, by Gunther Lenz and Christoph Wienands, Apress, 2006.
8. Guest editor of the IEEE Computer Special Issue on Model Driven Development, February 2006.
9. Guest co-editor of IEEE Network special issue on "Middleware Technologies for Future Communication Networks," February 2004 (co-editors with Gordon Blair and Andrew Campbell).
10. Editorial board member of the Springer Journal of Aspect-Oriented Software Development.
11. Wrote the foreword to the book *Fundamentals of Distributed Object Systems: The CORBA Perspective*, by Zahir Tari and Omran Bukhres, Wiley and Sons, 2001.
12. Wrote the foreword to the book *Design Patterns in Communication Software*, edited by Linda Rising, Cambridge University Press, 2000.
13. Guest editor of the Special Issue on Components and Patterns for *The Journal of Theory and Practice of Object Systems*, Wiley & Sons, to appear 2002.
14. Invited editorial on "Trends in Distributed Object Computing" for the special issue on Distributed Object-Oriented Systems appearing in the *Parallel and Distributed Computing Practices* journal, edited by Maria Cobb and Kevine Shaw, Vol. 3, No. 1, March 2000.
15. Co-editor of "Building Application Frameworks: Object-Oriented Foundations of Framework Design," John Wiley & Sons, 1999 (co-editors are Mohamed Fayad and Ralph Johnson), ISBN 0-471-24875-4.
16. Co-editor of "Implementing Application Frameworks: Object-Oriented Frameworks at Work," John Wiley & Sons, 1999 (co-editors are Mohamed Fayad and Ralph Johnson), ISBN 0-471-25201-8.
17. Guest editor of the Special Issue on OO Application Frameworks for the *Communications of the ACM*, (co-editor Mohamed Fayad), ACM, October, 1997.
18. Guest editor of the special issue on Distributed Object Computing for *USENIX Computing Systems Journal*, November/December, 1996.

19. Guest editor of a feature topic on Distributed Object Computing for IEEE Communications Magazine, February, 1997.
20. Wrote the foreward for Dr. Nayeem Islam's book on *Distributed Objects: Methodologies for Customizing Operating Systems* (IEEE Computer Society Press, 1996).
21. Guest editor of the Special Issue on Patterns and Pattern Languages for Communications of the ACM, (co-editors Ralph Johnson and Mohamed Fayad), ACM, October, 1996.
22. Co-editor of a book entitled "Pattern Languages of Program Design," Addison-Wesley, 1995 (co-editor Jim Coplien, Bell Labs).
23. Editor of the Patterns++ section of the C++ Report Magazine, April 1997 - March 1998.
24. Editor-in-chief of the C++ Report Magazine, January 1996 - February 1997.
25. Editorial board member of the IEEE Computer Society - Computer Science & Engineering Practice Board.

### **Program Chairmanships and Conference Organization**

1. Chair of the DoD Organic Software Infrastructure Workshop, Arlington VA, August 13th, 2018.
2. General Chair of the Software Product Line Conference, Nashville TN, July/August, 2015.
3. Program Chair of the Interoperable Open Architecture 2013 conference, September 10-11, 2013, Washington, DC.
4. Program Chair of the NSF Workshop on Computing Clouds for Cyber-Physical Systems, March 15th, 2013, Ballston, VA.
5. Program Chair of the Interoperable Open Architecture 2012 conference, October 29-31, 2012, London, UK.
6. Program co-chair for the 1st International Symposium on Secure Virtual Infrastructures (DOA-SVI'11), 17-19 Oct 2011, Crete, Greece.
7. Program co-chair for the COMmunication System softWAre and middleware (Comsware) conference, Helsinki, Finland, August 2010.
8. Doctoral symposium chair for OOPSLA 2009, Orlando Florida, October 25-29, 2009.
9. General co-chair for the 3rd ACM International Conference on Distributed Event-Based Systems (DEBS 2009), July 6-9, 2009 - Nashville, TN, USA.
10. Member of the ISORC 2009 advisory and publicity committee for ISORC 2009, March 17-20, 2009, Toyko, Japan.
11. Area Coordinator for the Integrating Systems of Systems using Services topic at the 6th International Conference on Service Oriented Computing, Sydney (Australia), December 1st - 5th, 2008.
12. Member of the Advisory and Publicity Committee for ISORC 2008, Orlando, Florida, May 5 -7, 2008.
13. Co-chair of the Middleware for Network Eccentric and Mobile Applications (MiNEMA.08) Workshop co-located with ACM EuroSys Conference, March 31 - April 1, 2008, Glasgow, Scotland.
14. General chair of the ACM/IEEE 10th International Conference on Model Driven Engineering Languages and Systems (MODELS 2007), Nashville TN, September 30-October 5, 2007.
15. Area co-coordinator for the Quality-of-Service research track at The Fifth International Conference on Service-Oriented Computing, September 17-20, 2007, Vienna, Austria.
16. Program co-chair of the NSF workshop on New Research Directions in Composition and Systems Technology for High Confidence Cyber Physical Systems, July 9, 2007.
17. Program co-chair for the Science of Design Principal Investigators workshop, February 28 to March 2, 2007.
18. Program co-coordinator for SOA Runtime area of the 4th International Conference on Service Oriented Computing Chicago, USA, December 4-7, 2006.
19. Program co-chair of the NSF/NCO Workshop on High-Confidence Software Platforms for Cyber-Physical Systems (HCSP-CPS) Workshop systems, November 30th to December 1st, 2006, Alexandria, VA.

20. Panels chair for the MoDELS 2006 conference, Genova Italy, Oct. 2-6, 2006.
21. Program Co-Chair of the Generative Programming and Component Engineering (GPCE) Conference, Portland, OR, October 2006 (collocated with OOPSLA '06).
22. Program Chair of the NSF/NCO Workshop on New Research Directions in High Confidence Software Infrastructure for Distributed Real-time and Embedded (DRE) systems, July 10th, 2006, Fairfax VA.
23. Program Co-Chair of the NSF/NCO High Confidence Medical Device Software and Systems (HCMDSS) Workshop, May 2005, University of Pennsylvania, Philadelphia, Pennsylvania.
24. Track Vice Chair for Real-time Middleware and Software Engineering for the Real-time Systems Symposium, Lisbon, Portugal, December, 2004.
25. Program Co-chair for the NSF/NCO Planning Meeting for the High Confidence Medical Device Software and Systems (HCMDSS) Workshop, November 16-17, 2004, Arlington, VA.
26. Program chair for 19th Annual ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOSPLA), October 24-28, 2004, Vancouver, British Columbia, Canada.
27. General co-chair of the IEEE Real-Time and Embedded Technology and Applications Symposium, May 25 – 28, 2004, Toronto, Canada.
28. Program chair of the CCM Workshop, December 10th, 2003, Nashville, TN.
29. General co-chair for the 5th International Symposium on Distributed Objects and Applications, November 3–7 2003, Catania, Sicily.
30. Program co-chair of the 3rd TAO Workshop, July 18, 2002, Arlington, VA.
31. Program co-chair for Middleware 2003, 4th IFIP/ACM/USENIX International Conference on Distributed Systems Platforms, June 16-20, 2003, Rio de Janeiro, Brazil.
32. Program co-chair for the 9th IEEE Real-time/Embedded Technology and Applications Symposium (RTAS), May 27-30, 2003, Washington, DC.
33. Area vice-chair and session chair for Middleware at the 23rd IEEE International Conference on Distributed Computing Systems (ICDCS), May 19-22nd, 2003, Providence, RI.
34. Program co-chair of the IEEE Workshop on LargeScale Real-Time and Embedded Systems, December 2, 2002, Austin, TX.
35. Program co-chair for the 4th International Symposium on Distributed Objects and Applications, October 28–November 1, 2002, Irvine, CA.
36. Co-organizer of the cross-agency Software Design and Productivity Coordinating Group Workshop on New Visions for Software Design and Productivity: Research and Applications, December 13-14, Nashville, TN.
37. Program co-chair for the 3rd International Symposium on Distributed Objects and Applications, September 18-20, 2001, Rome, Italy.
38. Co-organizer of the cross-agency Workshop on New Visions for Software Design and Productivity, April 18-19, 2000, Ballston, VA.
39. Area vice-chair and session chair for Middleware at the IEEE International Conference on Distributed Computing Systems, April 16-19, Phoenix, AZ, 2001.
40. Tutorial chair for the 6th USENIX Conference on Object-Oriented Technologies and Systems, January 27 - February 3, 2001, San Antonio, TX.
41. Co-chair of the OMG Workshop on Real-time and Embedded CORBA, in Reston, VA, July 24-27, 2000.
42. General chair of the IFIP/ACM International Conference Middleware 2000 in New York, April, 2000.
43. Tutorial chair for the 5<sup>th</sup> USENIX Conference on Object-Oriented Technologies and Systems, May 3-7, 1999, San Diego, CA.
44. Treasurer for the Fourth International Workshop on Object-oriented Real-time Dependable Systems (WORDS'99) January 27-29, 1999, Radisson Hotel, Santa Barbara, California, USA.

45. Tutorial chair for the 4<sup>th</sup> USENIX Conference on Object-Oriented Technologies and Systems, April 27-30, 1998, Santa Fe, New Mexico.
46. Co-chair of the mini-track on Engineering Client-Server Systems for the HICSS-31 conference, the Big Island of Hawaii - January 6-9, 1998.
47. Tutorial chair for the 3<sup>rd</sup> USENIX Conference on Object-Oriented Technologies and Systems, Portland, OR, June 1997.
48. Publicity chair for the 5<sup>th</sup> IEEE International Workshop on Object-Orientation in Operating Systems, IEEE TCOS and USENIX, Seattle, Washington, October 27-28, 1996.
49. Program chair for 3<sup>rd</sup> conference on Programming Languages of Programming, Allerton, IL, USA, September, 1996.
50. Program chair for the 2<sup>nd</sup> USENIX Conference on Object-Oriented Technologies, June 1996.

### **Professional Service and Advisory Positions**

1. Member of the William & Mary Veteran-to-Executive Transition (W&M VET) Advisory Group.
2. Member of the steering committee of the Assurance Evidence fo Continuously-Evolving Real-Time Systems (ASERT) Workgroup.
3. Member of the Fraunhofer Advisory Board for the University of Maryland, College Park.
4. Past member of the steering committee for the Software Product-Line Conference series.
5. Past member of the Future Airborne Capabilities Environment (FACE) Advisory Board.
6. Past Vice-Chair of the Cyber Situation Awareness study for the Air Force Scientific Advisory Board.
7. Past Member of the Joint Tactical Radio System (JTRS) Tiger Team in support of the Assistant Secretary of the Army, Acquisition, Logistics, and Technology.
8. Past Member of the Air Force Scientific Advisory Board.
9. Past Member of the advisory board for the NSF-sponsored Repository for Model-Driven Development (ReMoDD) project at Colorado State University.
10. Past Member of the National Academics Committee on Advancing Software-Intensive Systems Producibility, chaired by Bill Scherlis from Carnegie Mellon University (CMU).
11. Member of the Engineering and Methods Technical Advisory Group (TAG) for the Software Engineering Institute at Carnegie Mellon University (CMU) from 2006 to 2009.
12. Past Member of the Ultra-Large-Scale (ULS) Systems study commissioned by the US Army and conducted at the Software Engineering Institute at Carnegie Mellon University (CMU).
13. Past Member of the Joshua group, which is an advisory board for the Air Force Research Lab (AFRL) in Rome, NY.
14. Past Member of the steering committee for the Distributed Objects and Applications conference series.
15. Past Member of the steering committee for the ACM/USENIX/IFIP Middleware conference series.
16. Past Member of the steering committee for EMSOFT 2002: Second Workshop on Embedded Software, Grenoble, France, October, 7–9th, 2002.
17. Member of the steering committee for EMSOFT 2001: First Workshop on Embedded Software, Lake Tahoe, California, October, 8th–10th, 2001.
18. Past Member of the Board of Directors for the Embedded Systems Consortium for Hybrid and Embedded Research (ESCHER).
19. Past Member of the NASA/JPL Mars Science Laboratory Mission Concept Review Board.
20. Chair of the subcommittee on Embedded and Hybrid Systems program for the National Science Foundation's 2003 Committee of Visitors in the Computer and Communications Research (C-CR) Division.
21. Past Co-chair of the Software Design and Productivity (SDP) Coordinating Group of the Federal gov-

ernment's multi-agency Information Technology Research and Development (IT R&D) Program, the collaborative IT research effort of the major Federal science and technology agencies. The SDP Coordinating Group formulates the multi-agency research agenda in fundamental software design.

22. One of the three founding members of the Scientific Advisory Board for the *International Symposium of Distributed Objects and Applications* conference series.
23. Past Member of the advisory board for Entera, which provides Internet content delivery systems based on ACE.
24. Invited to participate in the OO Working Group of the "Strategic Directions in Computing Research" workshop sponsored by ACM at MIT in June 1996.

### Technical Program Committees

1. The Middleware for Autonomous AIoT Systems in the Computing Continuum (MAIoT'25) as part of ACM Middleware conference, Nashville, TN, December 15<sup>th</sup>-19<sup>th</sup>, 2025.
2. The 12th International Conference on Artificial Intelligence (ICOAI 2025), Paris, France, October 27-29, 2025.
3. Journal track of Ada-Europe International Conference on Reliable Software Technologies (AEIC 2025), Paris, France, June 2025.
4. International Workshop on Envisioning the AI-Augmented Software Development Life Cycle at the ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (FSE'25) Workshops Program, June 2025, Trondheim, Norway.
5. Journal track of the 28th Ada-Europe International Conference on Reliable Software Technologies (AEIC 2024), Barcelona, Spain, June 2024.
6. IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS 2023), 25-29th, September, 2023, Toronto, Canada.
7. Work-in-progress track, Ada-Europe 2023 conference, 13-16 June 2023, in Lisbon, Portugal.
8. Middleware 2022 Doctoral Symposium, Nov. 7-11, 2022 in Quebec Canada.
9. The 3rd IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS 2022) held virtually from 19th to 23rd September 2022.
10. The 16th ACM International Conference on Distributed and Event-Based Systems, June 27 to July 1, 2022, Copenhagen, Denmark.
11. 8th International Workshop on Middleware and Applications for the Internet of Things (M4IoT), held in December 2021 in conjunction with the ACM/IFIP International Middleware Conference.
12. Middleware 2021 Doctoral Symposium, Dec. 6-10, 2021 in Quebec Canada.
13. The 2nd IEEE International Conference on Autonomic Computing and Self-Organizing Systems (ACSOS 2021), September 27 to October 1, 2021, Washington DC, USA.
14. "Web of Things, Ubiquitous and Mobile Computing" Track for the Web Conference 2021, Ljubljana, Slovenia, from April 19-23, 2021.
15. 7th International Workshop on Middleware and Applications for the Internet of Things (M4IoT), December 2020 in conjunction with the ACM/IFIP International Middleware Conference.
16. 14th ACM International Conference on Distributed and Event-based Systems, July 13 to July 17, 2020, in Montreal, Quebec, Canada.
17. The Web Conference 2020: Web of Things, Ubiquitous, and Mobile Computing Track, April 20-24th, 2020, Taipei, Taiwan.
18. 6th Middleware for Context-Aware Applications in the IoT (M4IOT) workshop collocated with the ACM/IFIP/USENIX Middleware 2019 Conference, UC Davis, California, USA, December 9-13th 2019.
19. IEEE Workshop on IoT Big Data and Blockchain, at the 2019 IEEE International Conference on Big Data (IEEE Big Data 2019), December 9-12, 2019, Los Angeles, CA, USA.
20. The Second International Workshop on Blockchain Dependability, in conjunction with SRDS2019, Lyon, France, October 1, 2019.

21. The 13th ACM International Conference on Distributed and Event-based Systems, 4th-28th June, 2019, Darmstadt, Germany.
22. The “Web of Things, Ubiquitous, and Mobile Computing” track of The Web Conference 2019, San Francisco, CA, USA, May 13–17, 2019.
23. 17th Workshop on Adaptive and Reflexive Middleware (ARM), collocated with ACM/IFIP/Usenix Middleware 2018, December 10-14th, 2018, Rennes, France.
24. 25th International Conference on Pattern Languages of Programs (PLoP 2018), October 23 – 26th, Portland, OR, USA.
25. First International Workshop on Blockchain Dependability (WBD2018), held in conjunction with the 14th European Dependable Computing Conference, 10-14 September 2018, Iasi, Romania.
26. Workshop on Designing Resilient Intelligent Systems for Testability and Reliability, April 30 – May 4, 2018 in Seattle, USA (co-located with ICSA 2018).
27. 15th IEEE International Conference on Autonomic Computing (ICAC 2018), Sept 3-7, 2018, Trento, Italy.
28. International Conference on Information Society and Smart Cities (ISC 2018), Oxford city, United Kingdom 06-07 June, 2018.
29. 16th Workshop on Adaptive and Reflective Middleware workshop collocated with the ACM/IFIP/USENIX Middleware 2017 Conference, Las Vegas, Nevada, Dec 11-15, 2017.
30. 4th Middleware for Context-Aware Applications in the IoT (M4IOT) workshop collocated with the ACM/IFIP/USENIX Middleware 2017 Conference, Las Vegas, Nevada, Dec 11-15, 2017.
31. 10th International Workshop on Dynamic Software Product Lines - Adaptive Systems through Runtime Variability (DSPL '17), Sept 25-29, 2017, Sevilla, Spain.
32. 11th ACM International Conference on Distributed and Event-Based Systems (DEBS 2017), June 19 - 23, 2017, Barcelona, Spain.
33. 3rd Middleware for Context-Aware Applications in the IoT (M4IOT) workshop collocated with the ACM/IFIP/USENIX Middleware 2016 Conference, December 12-16, 2016 - Trento, Italy.
34. 7th International Symposium On Leveraging Applications of Formal Methods, Verification and Validation, October 5th – 14th, 2016, Corfu, Greece.
35. 10th ACM International Conference on Distributed and Event-based Systems, June 20 to June 24, 2016 in Irvine, CA.
36. First International Workshop on Science of Smart City Operations and Platforms Engineering (SCOPE), April 11, 2016, Vienna, Austria (Co-located with CPS Week).
37. 9th Dynamic Software Product Lines (DSLPL) 2015 (held as part of SASO 2015) at MIT on September 21, 2015.
38. 13th International Conference on Advances in Mobile Computing and Multimedia (MoMM2015), Brussels, Belgium from 10-12 December 2015.
39. 13th IEEE/IFIP International Conference on Embedded and Ubiquitous Computing (EUC 2015, track on Cyber Physical Systems, Porto Portugal, October 21-23, 2015.
40. 35th IEEE International Conference on Distributed Computing Systems (ICDCS), June 29 - July 2, 2015 in Columbus, Ohio, USA.
41. Fourth International Conference on Emerging Applications of Information Technology (EAIT) at Indian Statistical Institute, Kolkata, India, December 19-21, 2014.
42. The 20th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS 2014), Berlin, Germany, April 2014.
43. International Conference on Model-Driven Engineering and Software Development (MODELSWARD 2014), Lisbon, Portugal, 7-9 January, 2014.
44. 14th ACM/IFIP/USENIX International Middleware Conference (Middleware 2013), December 9- 13, Beijing, China.
45. 32nd International Symposium on Reliable Distributed Systems (SRDS 2013), September 30-

October 3, 2013 at Braga, Portugal.

46. 17th International Software Product Line Conference SPLC, Tokyo, Japan, 26-30 August 2013.
47. First International Workshop on Engineering Mobile-Enabled Systems, in conjunction with ICSE 2013, May 18-26th, 2013, San Francisco, CA.
48. International Conference on Model-Driven Engineering and Software Development (MODELSWARD 2013), Barcelona, Spain, 19-21 February, 2013.
49. ACM/USENIX/IFIP International Middleware conference, Montreal, Quebec, Canada, December 3-7, 2012.
50. 11th Workshop on Adaptive and Reflective Middleware, in conjunction with Middleware 2012 in Montreal, Quebec, Canada, December 3-7, 2012.
51. International Workshop on Real-Time and Distributed Computing in Emerging Applications (RE- ACTION) 2012, San Juan, Puerto Rico, December 4, 2012, in co-location with the 33rd IEEE Real-Time Systems Symposium.
52. Third International Conference on Emerging Applications of Information Technology (EAIT) November 29 - December 01, 2012, Kolkata, India.
53. IASTED International Conference on Parallel and Distributed Computing and Systems (PDCS), Las Vegas, USA, November 12 - 14, 2012.
54. 31st International Symposium on Reliable Distributed Systems (SRDS), 8th-11th October 2012. Irvine, California.
55. Sixth International Workshop on Dynamic Software Product Lines (DSPL), September 2 - 7, 2012, Salvador, Brazil.
56. 16th International Software Product Line Conference (SPLC 2012), Salvador, Brazil on 02-07 September 2012.
57. 5th International workshop UML and Formal Methods (UML&FM 2012), Paris, France, August 27-31, 2012.
58. UML&AADL 2012, July 18-20, 2012, Ecole Normale Superieure, Paris, France.
59. 17th IEEE International Conference on Engineering of Complex Computer Systems (ICECCS 2012), July 18-20, 2012, Ecole Normale Superieure, Paris, France.
60. COMPSAC 2012 - Trustworthy Software Systems for the Digital Society, July 16-20, 2012, Izmir, Turkey.
61. Foundations Track of the 8th European Conference on Modelling Foundations and Applications (ECMFA 2012), Copenhagen, Denmark, 2-6th of July, 2012.
62. 24th International Conference on Software Engineering and Knowledge Engineering, Redwood City, California, USA, July 1-3, 2012.
63. 12th IFIP International Conference on Distributed Applications and Interoperable Systems (DAIS'12), Stockholm, Sweden, 13-16 June 2012.
64. 15th IEEE International Symposium on Object and component-oriented Real-time distributed Computing (ISORC), April 11-13, 2012, Shenzhen, China.
65. 23rd IASTED International Conference on Parallel and Distributed Computing and Systems (PDCS 2011), Dallas, USA, December 14 to 16, 2011.
66. Fourth IEEE International Workshop on Real-Time Service-Oriented Architecture and Applications (RTSOAA 2011), December 12th-14th 2011, University of California, Irvine, CA.
67. ACM/IFIP/USENIX International Middleware Conference, Lisbon, Portugal, December 12th to 16th, 2011.
68. 9th International Conference on Advances in Mobile Computing and Multimedia (MoMM2011), Hue City, Vietnam, 05-07 December 2011.
69. Control Systems, Automation and Robotics track of the 3rd International Congress on Ultra Modern Telecommunications and Control Systems (ICUMT 2011), Hungary on October 5-7, 2011.

70. 15th IEEE International Enterprise Distributed Object Computing Conference (EDOC 2011), August 29th - September 2nd, 2011, Helsinki, Finland.
71. 15th International Software Product Line Conference (SPLC 2011), Research/Experience Track, Munich, Germany, August, 22-26, 2011.
72. 15th International Software Product Line Conference (SPLC 2011), Industry Track, Munich, Germany, August, 22-26, 2011.
73. 2nd Workshop on Formal Methods in Software Product Line Engineering - Munich (Germany), August 2011.
74. 23rd International Conference on Software Engineering and Knowledge Engineering (SEKE2011), Miami Beach, USA, July 7-9, 2011.
75. 2nd International Workshop on Analysis Tools and Methodologies for Embedded and Real-time Systems, July, 5th 2011, Porto, Portugal.
76. Fourth IEEE International workshop UML and Formal Methods, co-located with FM 2011, June 20th, 2011, Lero, Limerick, Ireland.
77. The Software Engineering and Data Engineering (SEDE 2011) conference, Las Vegas, Nevada, June 20-22, 2011.
78. 3rd International Workshop on Model-Driven Architecture and Modeling-Driven Software Development (MDA&MDSO 2011) in conjunction with the 6th International Conference on Evaluation of Novel Approaches to Software Engineering - ENASE 2011, Beijing Jiaotong University, 8-11, June 2011.
79. 11th International IFIP Conference on Distributed Applications and Interoperable Systems (DAIS 2011), Reykjavik, Iceland, June 6-9 2011.
80. Second Product Line Approaches in Software Engineering (PLEASE) workshop, collocated with 33rd International Conference on Software Engineering, Waikiki, Honolulu, Hawaii, May 21-28, 2011.
81. 16th Annual IEEE International Conference on the Engineering of Complex Computer Systems (ICECCS), April 27th-29th, 2011 Las Vegas, NV, USA.
82. Sixth IEEE International workshop UML and AADL, in conjunction with ICECCS 2011, April 27th, 2011, Las Vegas, USA.
83. First International Workshop on Cyber-Physical Networking Systems (CPNS'2011), in conjunction with INFOCOM 2011, April 15, 2011, Shanghai, China.
84. 2nd Workshop on Model Based Engineering for Embedded System Design (M-BED 2011), collocated with the Design, Automation, and Test in Europe (DATE) conference, 14-18, March, 2011, Grenoble, France.
85. Second International Conference on Emerging Applications of Information Technology (EAIT 2011), February, 2011 at Kolkata, India.
86. Fifth International Workshop on "Variability Modeling of Software-intensive Systems" (VaMoS '11), January 27-29 2011 in Namur, Belgium.
87. 9th Workshop on Adaptive and Reflective Middleware (ARM 2010) November 27, 2010, Bangalore India, collocated with Middleware 2010.
88. The 22nd IASTED International Conference on Parallel and Distributed Computing and Systems (PDCS 2010), November 8-10, 2010, Marina Del Rey, California.
89. International Conference on Software Engineering, Management, and Application (ICSEMA 2010) Kathmandu, Nepal, October 29th and 30th, 2010.
90. The MobiCPS 2010 workshop, held in conjunction with the 7th International Conference on Ubiquitous Intelligence and Computing (UIC2010), October 26-29, 2010 Xian, China.
91. Fourteenth IEEE International Enterprise Computing Conference (EDOC 2010), 25-29 October 2010, Vitoria, ES, Brazil.
92. Advances in Business ICT (ABICT) 2010 Workshop Wisla, Poland, October 18-20, 2010.
93. 3rd Workshop on Model Based Architecting and Construction of Embedded Systems (ACES-MB),

- held in conjunction with MoDELS 2010, Oslo, Norway, October 3-8, 2010.
94. 4th Dynamic Software Product Line Workshop held in conjunction with the 14th International Software Product Line Conference 2010, Jeju Island, South Korea, September 13-17, 2010.
  95. TOOLS Europe 2010, Malaga, Spain, June 28 to July 2, 2010.
  96. 22nd International Conference on Software Engineering and Knowledge Engineering (SEKE'2010), to be held July 1-3, 2010, Redwood City, California.
  97. 13th International Symposium on Component Based Software Engineering (CBSE 2010), June 23-25 2010 in Prague, Czech Republic.
  98. Sixth European Conference on Modelling Foundations and Applications (ECMFA), University of Pierre & Marie Curie, Paris, France. June 15-18, 2010.
  99. 10th IFIP WG 6.1 International Conference on Distributed Applications and Interoperable Systems (DAIS), Amsterdam, The Netherlands, June 7-9, 2010.
  100. The 11th OMG Real-time/Embedded CORBA workshop, Washington DC, May 24-26, 2010.
  101. Industrial track at the 32nd International Conference on Software Engineering (ICSE 2010), Cape Town (South Africa), May 2-8, 2010.
  102. Thirteenth International Conference on Business Information Systems (BIS 2010), Berlin, Germany, May 3-5 2010.
  103. 1st International Workshop on Product Line Approaches in Software Engineering, May 2nd, 2010, Cape Town, South Africa, held in conjunction with the 32nd International Conference on Software Engineering (ICSE 2010).
  104. Workshop on Effective Multicasting for Future Critical Networked Systems (EMFINES 2010), at the Eighth European Dependable Computing Conference (EDCC), Valencia, Spain, April 28-30, 2010.
  105. 1st Workshop on Model-Based Engineering for Embedded Systems Design, co-located with DATE 2010, March 12, 2010 in Dresden, Germany.
  106. IEEE International Conference on Engineering of Complex Computer Systems (ICECCS 2010), Oxford 22-26, March 2010.
  107. Special session on "Advanced Peer-to-Peer Protocols and Applications" at the Ninth IASTED International Conference on Parallel and Distributed Computing and Networks (PDCN 2010) February 16-18, 2010 Innsbruck, Austria.
  108. Fourth Variability Modelling of Software-intensive Systems (VaMoS '10) workshop, Linz, Austria - January 27-29, 2010.
  109. 8th Workshop on Adaptive and Reflective Middleware (ARM'09), in collocation with the 10th ACM/IFIP/USENIX Middleware Conference, in Urbana Champaign, Illinois, November 30th, 2009.
  110. Workshop committee for OOPSLA 2009, Orlando Florida, October 25-29, 2009.
  111. The ARTIST 2nd International Workshop on Model Based Architecting and Construction of Embedded Systems (ACESMB 2009), in conjunction with the 12th ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS 2009), October 6th, 2009, Denver, Colorado.
  112. The Thirteenth IEEE International EDOC Conference (EDOC 2009), 31 August - 4 September 2009, Auckland, New Zealand.
  113. The 10th OMG Real-time/Embedded CORBA workshop, Washington DC, July 13-15, 2009.
  114. The Software Engineering and Knowledge Engineering (SEKE'2009) conference, July 1-3, 2009, Boston, MA.
  115. 12th International Symposium on Component-Based Software Engineering (CBSE 2009), East Stroudsburg University, Pennsylvania, USA, June 22-25, 2009.
  116. The Second International Workshop on Cyber-Physical Systems (WCPS2009), held in conjunction with IEEE ICDCS 2009 in Montreal, Canada, June 22, 2009.

117. The Fifth European Conference on Model Driven Architecture Foundations and Applications (ECMDA), Gdansk, Poland, summer of 2009.
118. The 9th IFIP International Conference on Distributed Applications and Interoperable Systems (DAIS 2009) conference, Lisbon, Portugal, June 9-11, 2009.
119. The Fourth International Conference on COMmunication System softWAre and middlewaRE (COM-SWARE), 15th - 19th June 2009, Trinity College Dublin, Ireland.
120. The UML&AADL Workshop, held in conjunction with ICECCS 2009 The fourteenth IEEE International Conference on Engineering of Complex Computer Systems June 02, 2009, Potsdam, Germany.
121. The 15th Real-time and Embedded Applications Symposium (RTAS) 2009, Track B, Real-time and Embedded Applications, Benchmarks and Tools, San Francisco, CA, United States, April 13 - 16, 2009.
122. Member of the ISORC 2009 advisory and publicity committee for ISORC 2009, March 17-20, 2009, Toyko, Japan.
123. the 13th International Software Product Line Conference (SPLC), August 24-28, 2009, San Francisco, CA.
124. the European Conference on Model Driven Architecture - Foundations and Applications 2009, University of Twente, Netherlands, June 2009.
125. The third workshop on "Variability Modelling of Software-intensive systems" (VaMoS'09), January 28-30 2009 in Sevilla, Spain.
126. the 1st Workshop on Software Reuse Efforts, November 27-29, 2008 Brazil.
127. the 7th Workshop on Adaptive and Reflective Middleware (ARM'08) in collocation with the 9th ACM/IFIP/USENIX Middleware Conference, Leuven, Belgium, December 1st 2008.
128. the Middleware 2008 9th International Middleware Conference, December 1-6, 2008, Leuven, Belgium.
129. the 11th Component-Based Software Engineering conference, Karlsruhe, Germany, October 14-17, 2008.
130. the ARTIST International Workshop on Model Based Architecting and Construction of Embedded Systems (ACESMB 2008), in conjunction with the 11th ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS 2008), Toulouse, September 29th, 2008.
131. the 6th Java Technology for Real-Time and Embedded Systems (JTRES) conference, Santa Clara, California, USA, 24-26 September, 2008.
132. the 12th IEEE International Enterprise Distributed Computing Conference (EDOC) (EDOC 2008), 15-19 September 2008, Munich, Germany.
133. the First Workshop on Analyses of Software Product Lines (ASPL'08), September 12, 2008 in Limerick, Ireland in conjunction with SPLC'08.
134. the 9th OMG Real-time/Embedded CORBA workshop, Washington DC, July 14-17, 2008
135. the 3rd International Conference on Software and Data Technologies, July 5-8, 2008, Porto, Portugal.
136. the 20th International Conference on Software Engineering and Knowledge Engineering (SEKE'08), Redwood City, California, USA, July 1-3, 2008.
137. the TOOLS EUROPE 2008 conference, June 30 to July 4, 2008 at ETH Zurich.
138. National Conference on Research & Development in Hardware & Systems (CSI-RDHS 2008), Computer Society of India Kolkata Chapter & CSI Division I (Hardware & Systems), June 20-21, 2008, Kolkata, India.
139. the First International Workshop on Cyber-Physical Systems, Beijing, China, June 17 - 20, 2008.
140. the ECMDA 2008 (Fourth European Conference on Model Driven Architecture Foundations and Applications) in Berlin, June 09 - 12, 2008.
141. the Distributed Applications and Interoperable Systems (DAIS), Oslo, Norway, June 4, 2008.

142. the 2nd International Workshop on Ultra-Large-Scale Software-Intensive Systems (ULSSIS 2008), May 10-11, 2008 Leipzig, Germany.
143. the Automotive Systems Track at the 30th International Conference on Software Engineering (ICSE), Leipzig, Germany, 10-18 May 2008.
144. the Real-Time and embedded Applications / Benchmarks track at the 14th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS 2008), St. Louis, MO, April 22-24, 2008.
145. the 3rd UML and AADL Workshop held in conjunction with the 13th IEEE International Conference on Engineering of Complex Computer Systems, Belfast, Northern Ireland, 31 March - 4 April 2008.
146. the ACM Programming for Separation of Concern track at SAC 2008, Fortaleza, Brazil, March 16 - 20, 2008.
147. the 6th edition of the International Workshop on Adaptive and Reflective Middleware, held in conjunction with Middleware 2007 in Newport Beach, California.
148. the IEEE/ACM/USENIX Middleware conference, November 2007.
149. the IASTED International Conference on Parallel and Distributed Computing and Systems, PDCS 2007, Cambridge, MA, USA from Nov 19-21, 2007.
150. the 9th International Symposium on Distributed Objects, Middleware, and Applications (DOA), Iberian peninsula and islands, Oct 28 - Nov 2, 2007.
151. Member of the Doctoral Symposium committee at OOPSLA 2007, Portland, OR October 21-25, 2007.
152. the International Symposium on Ambient Intelligence and Computing, October 2007, Korea.
153. the IEEE conference on Enterprise Distributed Object Computing (EDOC), Annapolis, MD, October 15-19, 2007.
154. the 5th Java Technology for Real-Time and Embedded Systems (JTRES), Vienna, Austria, 26-28 September, 2007.
155. the Workshop on Trade-Off analysis of Software Quality Attributes (TOSQA), collocated with the sixth joint meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering, Dubrovnik, Croatia, September 3-7, 2007.
156. the 2nd International Conference on Software and Data Technologies, July 22-25th 2007, Barcelona, Spain.
157. the Fourth IEEE International Conference on Web Services, Salt Lake City, UT, July 9-13, 2007.
158. the 10th International Component-Based Software Engineering (CBSE) Symposium, Boston, MA, July 9-11 2007.
159. the 8th OMG Real-time/Embedded CORBA workshop, Washington DC, July 9-12, 2007.
160. the International Conference TOOLS EUROPE 2007, Zurich, Switzerland on June, 24-28 2007.
161. the track on "Real-Time and Embedded Applications and Benchmarks" for the 13th IEEE Real-Time and Embedded Technology and Applications Symposium, Bellevue, WA, April 3 - April 6, 2007.
162. the Workshop on the Foundations of Interactive Computation (FInCo 2007), Braga, Portugal, March 24 - April 1, 2007.
163. the 15th International Workshop on Parallel and Distributed Real-Time Systems (WPDRTS), Long Beach, California, 26-27 March, 2007.
164. the ACM Symposium on Applied Computing, Programming for Separation of Concerns track, Seoul, Korea, March 11 - 15, 2007.
165. the Workshop on Pervasive Computing Environments and Services (PCES 07), Naples, Italy, Feb 7-9, 2007.
166. the Minitrack on Components for Embedded and Real-time Systems at the 40th Hawaiian International Conference on System Sciences, January 3-6, 2007 at Waikoloa, Big Island, Hawaii.
167. the 13th Asia Pacific Software Engineering Conference (APSEC06), Bangalore, India, Dec 6-8, 2006.

168. the Real-time Middleware and Software Engineering track of the The 27th IEEE Real-Time Systems Symposium, December 5-8, 2006 Rio de Janeiro, Brazil.
169. the 2nd International Conference on Trends in Enterprise Application Architecture, November 29th to December 1st, 2006, Berlin, Germany.
170. the workshop on MModel Driven Development for Middleware (MODDM), November 27, 2006, Melbourne, Australia.
171. the International Symposium on Distributed Objects and Applications (DOA), Montpellier, France, Oct 29 - Nov 3, 2006.
172. the "Library-Centric Software Design" (LCSD'06) workshop at the OOPSLA'06 conference in Portland, Oregon, October 22-26, 2006.
173. Judge for the Student Research Competition at OOPSLA 2006, Portland, OR, October 23-24, 2006.
174. the NSF Workshop On Cyber-Physical Systems, October 16 - 17, 2006, Austin, Texas.
175. the Models at Run-Time MaRT-06 workshop held at the MoDELS 2006 conference, Genova Italy, Oct. 2-6, 2006.
176. the MoDELS 2006 conference, Genova Italy, Oct. 2-6, 2006.
177. the 7th OMG Real-time/Embedded CORBA workshop, Washington DC, July 11-14, 2006.
178. the European Conference on Object-Oriented Programming, Nantes, France, July 3-7, 2006.
179. the 9th International Symposium on Component-Based Software Engineering (CBSE 2006), Malmardalen University, Sweden, June 29th-1st July 2006.
180. the 28th International Conference on Software Engineering (ICSE 28), May 24-26, 2006, Shanghai, China.
181. the 14th International Workshop on Parallel and Distributed Real-Time Systems, April 25-26, 2006, Island of Rhodes, Greece.
182. the 9th IEEE International Symposium on Object-oriented Real-time Distributed Computing, April 24-26, 2006, Gyeongju, Korea.
183. the Automotive Software Workshop San Diego (ASWSD 2006), University of California, San Diego, March 15-17, 2006.
184. the C++ Connections: 20 Years of C++ conference, Nov 7-11, 2005, Mandalay Bay, Las Vegas, NV.
185. the Conference on Distributed Objects and Applications (DOA 2005), Oct 31 - Nov 4, 2005, Agia Napa, Cyprus.
186. the 20th Annual ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOSPLA), October 16-20, 2005, San Diego, CA, USA.
187. the 6th International Conference on Middleware (Middleware'2005), October, 2005, Grenoble, France.
188. the 2005 Monterey Workshop on Networked Systems, Laguna Beach, California, September 22-24, 2005.
189. The 12th Pattern Language of Programs (PLoP 2005), September 7-10, 2005, Allerton Park, Monticello, Illinois, USA.
190. the 14th IEEE International Symposium on High-Performance Distributed Computing (HPDC-14), Research Triangle Park, North Carolina, July 27, 2005.
191. the 5th International Workshop on Software and Performance (WOSP 2005), Palma de Mallorca, Spain, July 11-15, 2005.
192. the 6th OMG Real-time/Embedded CORBA workshop, Washington DC, July 11-14, 2005.
193. the 5th IFIP WG 6.1 International Conference on Distributed Applications and Interoperable Systems (DAIS 2005), June 15-17, 2005, Athens, Greece.
194. the International Conference on Autonomic Computing (ICAC 2005), Seattle, WA, June 2005.

195. the International Symposium on Component-Based Software Engineering (CBSE), co-located with the International Conference on Software Engineering (ICSE), May 14-15, 2005, St. Louis, MO.
196. the Foundations of Interactive Computation (FINCO'05) Workshop, Saturday, 9 April 2005, in Edinburgh, Scotland.
197. the Embedded Applications track of the IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS) 2005, San Francisco, California, March 2005.
198. the "Programming for Separation of Concerns" track at Symposium on Applied Computing (SAC 2005), Santa Fe, New Mexico, March 2005.
199. the 12th International Symposium on the Foundations of Software Engineering, November 6th, 2004, Newport Beach, California.
200. the Conference on Distributed Objects and Applications (DOA 2004), October 25-29, 2004 in Cyprus, Greece.
201. the 2nd International Workshop on Java Technologies for Real-Time and Embedded Systems (JTRES), October 25-29, 2004, Larnaca, Cyprus.
202. the 3rd Workshop on Reflective and Adaptive Middleware (RM2004), October 19, 2004, Toronto, Ontario, Canada.
203. the Middleware 2004 5th IFIP/ACM/USENIX International Conference on Distributed Systems Platforms, October 18-22, 2004, Toronto, Canada.
204. the 4th TAO+CIAO Workshop, Arlington, VA, July 16, 2004.
205. the DARPA Workshop on Java in Real-Time and Embedded Defense Applications, Arlington, VA, July 13, 2004.
206. the OMG Real-time/Embedded CORBA workshop, Crystal City, VA, July 12-15, 2004.
207. the ECOOP 2004 conference, June 14-18, 2004, Oslo, Norway.
208. the Middleware track of the 24th IEEE International Conference on Distributed Computing Systems (ICDCS), May 23-26, 2004, Tokyo, Japan.
209. the 2nd International Workshop on Remote Analysis and Measurement of Software Systems (RAMSS), Edinburgh, Scotland, UK, May 24, 2004.
210. Aspect-Oriented Software Development conference, Lancaster, England, March 22-26, 2004.
211. the SPIE/ACM Conference on Multimedia Computing and Networking, January 21-22, 2004 Santa Clara, California.
212. the Real-time Systems Symposium (RTSS), Cancun, Mexico, December 3-5, 2003.
213. the 4th IFIP International Conference on Distributed Applications and Interoperable Systems (DAIS), Paris - France November 17-21, 2003.
214. the International Workshop on Java Technologies for Real-Time and Embedded Systems (JTRES), November 3-7, 2003, Catania, Sicily, Italy.
215. the Domain Driven Development track at the OOPSLA 2003 18th Annual ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications, October 26-30, 2003, Anaheim, California, USA.
216. the OOPSLA 2003 18th Annual ACM SIGPLAN Conference on Object-Oriented Programming, Systems, Languages, and Applications, October 26-30, 2003, Anaheim, California, USA.
217. External reviewer for the 2nd Generative Programming and Component Engineering (GPCE '03) conference, Erfurt, Germany, September 22-25, 2003.
218. the OMG Real-time/Embedded CORBA workshop, Crystal City, VA, July 14-17, 2003.
219. the The 2nd Workshop on Reflective and Adaptive Middleware, Rio de Janeiro, Brazil, June 17, 2003.
220. the ACM SIGPLAN 2003 Conference on Programming Language Design and Implementation (PLDI), San Diego, California, June 9 - 11, 2003.
221. the 1st International Workshop on Remote Analysis and Measurement of Software Systems (RAMSS),

Portland, Oregon, May 9, 2003.

222. External reviewer for the 17th International Parallel and Distributed Processing Symposium, April 22–26, 2003, Nice, France.
223. the ACM International Conference on Aspect-Oriented Software Development, March 17 - 21, 2003, Boston, MA.
224. the SPIE/ACM Conference on Multimedia Computing and Networking, Santa Clara, California, January 29–31, 2003.
225. the International Workshop on Product Line Engineering The Early Steps: Planning, Modeling, and Managing (PLEES '02), Seattle, WA, November 5, 2002.
226. the 8th IEEE Real-Time and Embedded Technology and Application Symposium (RTAS), San Jose, CA, September 24-27, 2002.
227. the 9th Conference on Pattern Language of Programs, Allerton Park, IL, September 8-12, 2002.
228. the Workshop on Dependable Middleware-Based Systems, held as a part of DSN 2002, Washington, D.C., June 23-36, 2002.
229. the 2nd TAO Workshop, Arlington, VA, July 19, 2002.
230. the OMG Real-time/Embedded CORBA workshop, Crystal City, VA, July 15–18, 2002.
231. the 16th European Conference on Object-Oriented Programming, University of Malaga, Spain June 10-14, 2002.
232. the Tenth International Workshop on Quality of Service (IWQoS), May 15-17, 2002, Miami Beach, Florida.
233. the International Symposium on Object-Oriented Real-time Distributed Computing (ISORC), Washington DC, April 29 – May 1, 2002.
234. the Seventh IEEE International Workshop on Object-oriented Real-time Dependable Systems (WORDS 2002), January 7-9, 2002, San Diego, CA.
235. the International Workshop on Multimedia Middleware October 5th, 2001, Ottawa, Canada.
236. the OMG Workshop on Real-time and Embedded CORBA, in Reston, VA, June 4-6, 2001.
237. the USENIX 2001 conference, Boston, MA, June 25-30, 2001.
238. the International Symposium on Object-oriented Real-time Distributed Computing (ISORC), May 2-4, Magdenburg, Germany, 2001.
239. the 6th USENIX Conference on Object-Oriented Technologies and Systems, January 27 - February 3, 2001, San Antonio, TX.
240. External reviewer for OOPSLA 2000, Minneapolis, MN, October 2000.
241. the 3rd IFIP International Conference on Trends towards a Universal Service Market (USM'2000), September 12-14, 2000.
242. the International Symposium on Distributed Objects and Applications (DOA '00), OMG, Antwerp, Belgium, September 2000.
243. the ACM SIGCOMM 2000, Stockholm, Sweden, August 30 to September 1st, 2000.
244. the Pattern Languages of Programming (PLoP) conference, Monticello, Illinois, August, 2000.
245. the 9th IEEE International Conference on High-Performance Distributed Computing, August, 2000.
246. the "International Workshop on Software Engineering for Parallel and Distributed Systems" (PDSE 2000), at the 22nd International Conference on Software Engineering (ICSE-2000), in Limerick, Ireland in June, 2000.
247. the 6th IEEE Real-Time Technology and Application Symposium (RTAS), May 17-19, 2000, Washington DC, USA.
248. the 1999 ACM OOPSLA conference, Denver, Colorado, November 1-5, 1999.
249. the IFIP Sixth International Workshop on Protocols For High-Speed Networks (PfHSN '99), Wednesday August 25 – Friday August 27, 1999 Salem, MA.

250. the 1999 IEEE Real-Time Technology and Applications Symposium (RTAS99), Vancouver, British Columbia, Canada, June 2-4, 1999.
251. the 5th USENIX Conference on Object-Oriented Technologies and Systems, May 3-7, 1999, San Diego, CA.
252. Technical workshop committee for the International Software Architecture workshop, ACM SIG-SOFT's FSE9 conference in Orlando FL, November 1-5, 1998.
253. the workshop on Software and Performance (WOSP98), Santa Fe, New Mexico, Oct 12-16 1998.
254. the IFIP International Conference on Distributed Systems Platforms and Open Distributed Processing: Middleware '98. September 15-18 1998, The Lake District, England.
255. the TOOLS USA'98 conference. Santa Barbara, California, August 3 - 7, 1998.
256. the IEEE High Performance Distributed Computing conference, Chicago, IL, July 28-31, 1998.
257. 12<sup>th</sup> European Conference on Object-Oriented Programming, Brussels, Belgium, July 20 - 24, 1998.
258. the 3rd EuroPLOP conference, Kloster Irsee, Germany, July 9-11, 1998.
259. the IEEE International Conference on Configurable Distributed Systems (ICCDs '98), Annapolis, MD, May 4-6, 1998.
260. the IEEE IWQoS '98 in Napa Valley, CA, May 18-20, 1998.
261. the 4th USENIX Conference on Object-Oriented Technologies and Systems, April 26-29, 1998, Santa Fe, New Mexico.
262. the 3<sup>rd</sup> International Workshop on Software Engineering for Parallel and Distributed Systems, at the 20th International Conference on Software Engineering (ICSE-20), in April 20-21, Kyoto, Japan.
263. the IEEE Conference on Open Architectures and Network Programming, April 3-4, 1998, San Francisco, CA.
264. the Workshop on Middleware for Real-Time Systems and Services, held in conjunction with IEEE Real-time Systems Symposium, December 2nd, San Francisco, California.
265. the Open Signaling for ATM, Internet and Mobile Networks. October 6th and 7th, 1997, Columbia University, New York, NY.
266. the 24<sup>th</sup> International Conference on Technology of Object-Oriented Languages and Systems (TOOLS Asia '97). Beijing, China, September 22 - 25, 1997.
267. the 4<sup>th</sup> Pattern Languages of Programming conference, Allerton Park, Illinois, September 3-5, 1997.
268. the 3<sup>rd</sup> USENIX Conference on Object-Oriented Technologies and Systems, Portland, June 16-19th 1997.
269. Session chair of the Patterns technical paper session at ECOOP '97, June 13th, 1997.
270. the 1997 European Conference on Object-Oriented Programming (ECOOP), June 9-13, 1997, Jyväskylä, Finland.
271. Chair of the technical session on "Distributed Object Computing" for the IFIP/IEEE Fifth International Workshop on Quality of Service (IWQoS '97).
272. the 2<sup>nd</sup> International Workshop on Software Engineering for Parallel and Distributed Systems, at the 19<sup>th</sup> International Conference on Software Engineering (ICSE-19) Sheraton Boston Hotel and Towers, Boston, Massachusetts, USA, May 19 and 20, 1997.
273. the 3<sup>rd</sup> USENIX Conference on Object-Oriented Technologies and Systems, Portland, 1997.
274. the 5<sup>th</sup> IEEE International Workshop on Object-Oriented Systems, IEEE TCOS and USENIX, Seattle, Washington, October 27-28, 1996.
275. the 1997 ACM SIGCOMM conference, Cannes, French Riviera, France, September 1997.
276. the 1997 IEEE INFOCOM conference, Kobe, Japan, April 1997.
277. the 1996 IEEE INFOCOM conference, San Francisco, CA, USA, March 24-28, 1996.
278. the 1995 IEEE INFOCOM conference, Boston, Massachusetts, USA, April, 1995.

279. the 3<sup>rd</sup> IEEE workshop on Architecture and Implementation of High-Speed Communication Sub-systems (HPCS '95), held in Mystic, Connecticut, August 1995.
280. the 8<sup>th</sup> IFIP International Working Conference on Upper Layer Protocols, Architectures, and Applications, held in Barcelona, Spain, June 1 to 3, 1994.

### Workshops and Panels Organized

1. Co-organized the International Workshop on Envisioning the AI-Augmented Software Development Life Cycle (AI-SDLC), June 24, 2025 collocated with FSE 2025 in Trondheim, Norway.
2. Co-organized the 1st International Workshop on Data Dissemination for Large scale Complex Critical Infrastructures (DD4LCCI 2010), at the Eighth European Dependable Computing Conference, Valencia, Spain, April 28-30, 2010.
3. Co-organized the OOPSLA Jeopardy panel at OOPSLA 2009, Orlando Florida, October 25-29, 2009.
4. Co-organized a workshop entitled First International Workshop on Software Technologies for Ultra-Large-Scale (ULS) Systems at 29th Int. Conference on Software Engineering, May 20-29th, Minneapolis, MN, 2007.
5. Co-organized a session on architectures, platforms, and standards for QoS-enabled dissemination at the Systems and Information Interoperability Meeting, Oct 25-27, 2006 at the Minnowbrook Conference Center, Blue Mountain Lake, NY.
6. Co-organized a workshop entitled "Breathturn: Ultra Large Scale Systems" at OOPSLA 2006, October 26, 2006, Portland, OR.
7. Co-chair of the NSF workshop on open-source Middleware for Distributed Real-time and Embedded Systems, 7th OMG Real-time/Embedded CORBA workshop, Arlington, VA, July 10-13, 2006.
8. Organized and led a session on architectures, platforms, and standards for real-time tactical information management at the Systems and Information Interoperability Meeting, Oct 18-21, 2005 at the Minnowbrook Conference Center, Blue Mountain Lake, NY.
9. Co-organizer of the technical workshops program at OOPSLA 2005, San Diego, October 16th-20, 2005.
10. Co-organizer for the MODELS 2005 workshop on "MDD for Software Product-lines: Fact or Fiction?", October 2, 2005, Jamaica.
11. Co-organizer of the OOPSLA '02 workshop on "Patterns in Distributed Real-Time and Embedded Systems", Seattle, WA, November, 2002.
12. Co-organizer of the OOPSLA '01 workshop on "Towards Patterns and Pattern Languages for OO Distributed Real-time and Embedded Systems" Tampa Bay, FL, October 14, 2001.
13. Organizer and chair of a panel on real-time extensions to OO middleware, OPENSIG Fall '97 workshop on Open Signaling for ATM, Internet and Mobile Networks Columbia University, October 6-7 1997, New York, NY.
14. Co-organizer of a workshop for the 1997 European Conference on Object-Oriented Programming entitled CORBA: Implementation, Use, and Evaluation, Jyvaskyla, Finland, June 10th, 1997.
15. Organizer and chair of a panel on "QoS and Distributed Systems Platforms" for the IFIP Fifth International Workshop on Quality of Service (IWQoS '97), May 22-24th, 1997, Columbia University, New York.
16. Co-organizer of the OOPSLA '95 workshop on "Patterns for Concurrent, Parallel, and Distributed OO Systems."
17. Co-facilitator of the ECOOP '95 workshop on Pattern Languages of Object-Oriented Programs, Aarhus, Denmark, August 1995.

### Reviewer for Professional Submittals

Reviewed papers for the following journals, conferences, books, reports, and grant review processes:

1. The 32nd International PLoP 2025 conference on Pattern Languages of Programs, People & Practices.
2. The National Academy of Sciences report on *Defense Software for a Contested Future: Agility, Assurance, and*

- Incentive*, May, 2025.
3. Reviewer for COVID-19 proposals to the C3.ai Digital Transformation Institute, June, 2020.
  4. *The 21st IEEE International Symposium on Real-time Computing (ISORC)*, Nanyang Technological University, Singapore, 29th - 31st May 2018.
  5. *Future Generation Computer Systems*, Elsevier, edited by Aniruddha Gokhale et al., 2016.
  6. *IEEE Software*, Special Issue on Next Generation Mobile Computing, edited by James Edmondson et al., 2013.
  7. *Software Testing in the Cloud*, edited by Scott Tilley, 2012.
  8. Elsevier Information & Software Technology special issue on Software Reuse and Product Lines, 2012.
  9. The 2010 Military Communications Conference, Cyber Security and Network Management, San Jose, CA, October 31-November 3, 2010.
  10. *Model-Driven Domain Analysis and Software Development: Architectures and Functions*, edited by Janis Osis and Erika Asnina, 2010.
  11. Reviewer for the book "Patterns for Parallel Software Design," by Jorge L. Ortega Arjona, Wiley, 2010.
  12. Special Issue on Industrial Applications of Aspect Technology for the journal Transactions on Aspect-Oriented Software Development (TAOSD), 2009.
  13. *Software Engineering for Self-Adaptive Systems*, edited by Betty H. C. Cheng, Rogerio de Lemos, Holger Giese, Paola Inverardi, and Jeff Magee, Springer, 2009.
  14. Special issue on Service Oriented Computing for the ACM Transactions on the Web journal, 2008.
  15. Special Issue in Software Reuse: Methods, Processes, Tools and Experiences for the Journal of the Brazilian Computer Society (JBSC), 2007
  16. Designing Software-Intensive Systems: Methods and Principles book, 2008
  17. Special issue on Patterns for the IEEE Software, 2007
  18. IEEE Internet Computing Magazine, 2006.
  19. IEEE Transactions on Parallel and Distributed Systems, 2004
  20. International Journal of Software Process: Improvement and Practice Special issue - Software Variability: Process and Management
  21. IEEE Internet Computing Magazine
  22. 2004 NSF NSG panel
  23. IEEE Transactions on Parallel and Distributed Computing special issue on Middleware, 2003
  24. 2003 NSF ITR panel
  25. 2002 NSF CAREER panel
  26. IEEE Internet Computing Magazine, 2002
  27. NIST Competence Proposals, May 2002
  28. DARPA MoBIES program, May 2002
  29. DARPA NEST program, May 2002
  30. DARPA DASADA program, April 2002
  31. Elsevier Journal of Systems and Software Special Issue on Software Architecture: Engineering Quality Attributes, 2002.
  32. IEEE Communications Magazine, Evolving Communications Software: Techniques and Technologies, 2001
  33. DARPA Network Embedded Software Technology (NEST) program, 2001
  34. DARPA Software Enabled Control (SEC) program, 2000

35. IEEE Concurrency magazine, Object-Oriented Systems Track, 1999
36. IEEE Journal on Selected Areas in Communications special issue on "Service Enabling Platforms for Networked Multimedia Systems," 1999
37. IEEE Journal of Communications and Networks, 1999
38. Reviewer for the 4<sup>th</sup> Pattern Languages of Programming Design book published by Addison Wesley
39. The International Journal of Time-Critical Computing Systems, special issue on Real-time Middleware, edited by Wei Zhao
40. Next Generation Internet (NGI) networking research review panel, October 1998
41. IEE Transactions on Software Engineering, special issue on Configurable Distributed Systems
42. Theme issue on Symbolic Modeling in Practice for the Communications of the ACM
43. "Multimedia DBMS and the WWW" Minitrack at the 32nd Hawaii International Conference on System Sciences, 1999
44. "Dependable Distributed Systems" Minitrack at the 32nd Hawaii International Conference on System Sciences, 1999
45. IEEE Computer special issue on "Design Challenges for High-Performance Network Interfaces," 1998
46. 1998 NSF Experimental Software Systems review panel.
47. ACM SIGMetrics Conference, 1998
48. ACM Transactions on Software Engineering Methods
49. Special Issue on Patterns and Pattern Languages for the journal of Theory and Practice of Object Systems, (Stephen P. Berczuk, Editor), John Wiley and Sons, 1995
50. Special Issue of Computer Communications on Building Quality of Service into Distributed Systems
51. IEEE Communications Magazine
52. IEEE/ACM Journal of Transactions on Networking
53. Communications of the ACM
54. IEE/BCS Distributed Systems Engineering Journal
55. Software Practice and Experience, John Wiley and Sons
56. 1998, 1997, and 1996 NSF networking program
57. 1996 NSF software engineering and programming languages CAREER panel
58. 1994 California MICRO (Microelectronics Innovation Computer Research Opportunity) engineering computer network grant review process
59. IEEE Conference on Parallel and Distributed Computing Systems, 1994
60. IEEE International Conference on Computer Communications and Networks, 1994
61. IEEE INFOCOM conference, 1994
62. 1993 NASA Applied Information Systems Research grant review process
63. 1992 California MICRO (Microelectronics Innovation Computer Research Opportunity) engineering computer network grant review process
64. 7<sup>th</sup> IFIP International Conference on Upper Layer Protocols, Architectures, and Applications, 1992
65. The 1992 Special Issue on Measurement for IEEE Journal Transactions on Software Engineering.

## Patents

1. US patent 7,523,471 – "Interpretive network daemon implemented by generic main object," in conjunction with Karlheinz Dorn, Dieter Quehl, Detlef Becker, and Christian Scharf of SIEMENS Medical Engineering, Erlangen, Germany, 2009.

## Theses Supervised

**• Doctoral and Master's Committees Chaired**

1. Chaired the MS thesis committee for Brian Sharber, November 2023.
2. Chaired the master's committee for Chi-Cheng Chang, December 2022.
3. Chaired the master's thesis committee for Cici Wang, November 2021.
4. Chaired the master's thesis committee for Evan Segaul, March 2021.
5. Co-chair of the doctoral dissertation defense for Peng Zhang, August 2018.
6. Co-chair of the doctoral dissertation defense for James Edmondson, March 2012.
7. Co-chair of the doctoral topic defense for James Edmondson, December 2011.
8. Co-chair of the doctoral dissertation defense for Will Otte, November 2011.
9. Chair of the doctoral dissertation defense for Brian Dougherty, March 2011.
10. Chair of the doctoral topic defense for Brian Dougherty, June 2010.
11. Chair of the master's defense for Pooja Varshneya, May 2010.
12. Chair of the doctoral topic defense for Nilabja Roy, March 2010.
13. Chair of doctoral topic defense for Joe Hoffert, November 2009.
14. Chair of the doctoral dissertation defense for Jai Balasubramanian, September 2009.
15. Chair of master's defense for Friedhelm Wolf, March 2009.
16. Chair of the doctoral dissertation defense for Nishanth Shankaran, October 2008.
17. Chair of the doctoral dissertation defense for Jules White, October 2008.
18. Chair of doctoral dissertation defense for Gan Deng, December 2007.
19. Chair of doctoral dissertation defense for Krishnakumar Balasubramanian, September 2007.
20. Chair of the doctoral topic defense for Nishanth Shankaran, April 2007.
21. Chair of doctoral topic defense for Krishnakumar Balasubramanian, March 2006.
22. Chair of doctoral topic defense for Gan Deng, March 2006.
23. Chair of final doctoral dissertation defense for Arvind Krishna, December 2005.
24. Chair of master's thesis committee for Emre Turkay, summer 2005.
25. Chair of doctoral topic defense for Arvind Krishna, summer 2005.
26. Chair of master's thesis committee for Ossama Othman, December, 2002.
27. Chair of doctoral dissertation committee for Carlos O'Ryan, May, 2002.
28. Chair of dissertation topic defense committee for Carlos O'Ryan, September, 2001.
29. Chair of master's committee for Nagarajan Surendran, August, 1999.
30. Chair of master's committee for Alexander Babu Arulanthu, July, 1999.
31. Chair of oral exam committee for Chris Gill, June, 1999.
32. Chair of doctoral exam committee for Andy Gokhale, May, 1998.
33. Chair of master's exam committee for Sumedh Mungee, May, 1998.
34. Chair of master's exam committee for Sergio Flores, May, 1998.
35. Chair of master's committee for Prashant Jain, June 1997.
36. Chair of doctoral topic defense for James Hu, February 1997.
37. Chair of master's committee for Tim Harrison, February 1997.
38. Chair of doctoral topic defense for Andy Gokhale, October, 1996.

**• Doctoral and Master's Committees Member**

1. Served on the doctoral dissertation defense for Carlos Olea, August 2025.

2. Served on the doctoral dissertation defense for Michael Sandborn, August 2024.
3. Served on the doctoral topic defense for Michael Sandborn, March 2024.
4. Served on the doctoral dissertation defense for Sam Hays, March 2024.
5. Served on the doctoral dissertation defense for Henry Gilbert, March 2024.
6. Served on the MS thesis committee for Lincoln Muir, March 2024.
7. Served on the doctoral topic defense for Henry Gilbert, January 2024.
8. Served on the doctoral topic defense for Sam Hays, October 2023.
9. Served on the doctoral dissertation defense for Quchen Fu, February 2023.
10. Served on the doctoral dissertation defense for Zhongwei Teng, November 2022.
11. Served on the doctoral topic defense for Quchen Fu, September 2022.
12. Served on the doctoral topic defense for Zhongwei Teng, April 2021.
13. Served on the master's thesis committee for Gabriela Gresenz, March 2021.
14. Served on the master's thesis committee for Xiaoxing Qiu, March 2021.
15. Served on the doctoral dissertation defense for Anirban Bhattacharjee, January 2020.
16. Served on the doctoral topic defense for Anirban Bhattacharjee, April 2019.
17. Served on the doctoral dissertation defense for Shunxing Bao, September 2018.
18. Served on the doctoral dissertation defense for Shashank Shekhar, May 2018.
19. Served on the doctoral dissertation defense for Fangzhou Sun, March 2018.
20. Served on the doctoral topic defense for Shunxing Bao, March 2018.
21. Served on the doctoral topic defense for Peng Zhang, January 2018.
22. Served on the doctoral dissertation defense for Marcelino Rodriguez-Cancio, December 2017.
23. Served on the doctoral dissertation defense for Yao Pan, November 2017.
24. Served on the doctoral topic defense for Fangzhou Sun, September 2017.
25. Served on the doctoral topic defense for Shashank Shekhar, May 2017.
26. Served on the doctoral topic defense for Yao Pan, February 2017.
27. Served on the doctoral dissertation defense for Faruk Caglar, July 2015
28. Served on the doctoral dissertation defense for Wei Yan, May 2015.
29. Served on the doctoral dissertation defense for Kyoungho An, March 2015.
30. Served on the master's thesis committee for Songtao Hei, March 2015.
31. Served on the master's thesis committee for Meng Wang, March 2015.
32. Served on the doctoral dissertation defense for Sean Hayes, January 2015.
33. Served on the doctoral dissertation defense for Hamilton Turner, November 2014.
34. Served on the doctoral topic defense for Faruk Caglar, November 2014.
35. Served on the doctoral topic defense for Hamilton Turner, February 2014.
36. Served on the doctoral dissertation defense for Fan Qui, February 2014.
37. Served on the doctoral dissertation defense for Xiaowei Li, May 2013.
38. Served on the doctoral topic defense for Fan Qiu, April 2013.
39. Served on the doctoral dissertation defense for Janos Mathe, August 2012.
40. Served on the doctoral dissertation defense for Tripti Saxena, July 2012.
41. Served on the doctoral dissertation defense for Akshay Dabholkar, April 2012.
42. Served on the doctoral topic defense for Xiawei Li, March 2012.

43. Served on the doctoral topic defense for Janos Mathe, August 2011.
44. Served on the doctoral dissertation defense for Liang Dai, April 2011.
45. Served on the doctoral dissertation defense for Daniel Balasubramanian, March 2011.
46. Served on the doctoral topic defense for Will Otte, February 2011.
47. Served on the doctoral topic defense for Akshay Dabholkar, February 2011.
48. Served on the doctoral dissertation defense for Joe Hoffert, February 2011.
49. Served on the doctoral topic defense for Tripti Saxena, January 2011.
50. Served on the doctoral dissertation defense for Nilabja Roy, November 2010
51. Served on the doctoral topic defense for Daniel Balasubramanian, October 2010.
52. Served on the doctoral dissertation defense for Sumant Tambe, September 2010.
53. Served on the doctoral topic defense for Sumant Tambe, April 2010.
54. Served on the doctoral dissertation defense for John Kinnebrew, March 2010.
55. Served on the doctoral dissertation defense for Shanshan Jiang, November 2009.
56. Served on the doctoral dissertation defense for James Hill, March 2009.
57. Served on the doctoral topic defense for James Hill, October 2008.
58. Served on the doctoral topic defense for Jai Balasubramanian, August 2008.
59. Served on the doctoral topic defense for Liang Dai, December 2008.
60. Served on the doctoral topic defense for Shanshan Jiang, November 2008.
61. Served on the doctoral topic defense for Jules White, April 2008.
62. Served on the doctoral topic defense for Amogh Kavimandan, February 2008.
63. Served on the doctoral dissertation defense for Amogh Kavimandan, November 2008.
64. Served on the doctoral topic defense for Amogh Kavimandan, February 2008.
65. Served on the doctoral dissertation defense for Michael Stal, University of Groningen, March 2007.
66. Served on the doctoral topic defense for Karlkim Suwanmongkol, fall 2004.
67. Served on the doctoral dissertation topic defense committee for Aditya Agrawal, July, 2004.
68. Served on the doctoral dissertation defense for Angelo Corsaro, July 2004.
69. Served on the doctoral dissertation defense for Nanbor Wang, April 2004.
70. Served on the doctoral topic defense for Angelo Corsaro, October 2003.
71. Served on the doctoral dissertation defense committee for Jonathan Sprinkle, July, 2003.
72. Served on the doctoral dissertation topic defense committee for Aditya Agrawal, June, 2003.
73. Served on master's committee for Kirk Kelsey, March 2003.
74. Served on the dissertation topic defense committee for Jonathan Sprinkle, February, 2003.
75. Served as external examiner for Bob Jolliffe's master's thesis Department of Computer Science, University of South Africa, March, 2003.
76. Served on the doctoral dissertation committee for Irfan Pyarali, December, 2001.
77. Served on the doctoral dissertation committee for Chris Gill, December, 2001.
78. Served as external examiner for Daniel Heggander's Ph.D. dissertation in the Department of Software Engineering and Computer Science at Blekinge Institute of Technology, Sweden, September, 2001.
79. Served as external examiner for Mohammad Radaideh's master's thesis in the Electrical Engineering department at McMaster's University, Canada, Winter 2000.
80. Served as external examiner for David Holmes' Ph.D. dissertation in the information and com-

puter sciences department at Macquarie University, Sydney, Fall 1999.

81. Served on final doctoral dissertation committee for Priya Narasimhan, August, 1999.
82. Served on the doctoral final dissertation defense for Christo Papadopoulos, August, 1999.
83. Served on dissertation topic defense for Michael Plezbert, February, 1999.
84. Served on master's committee for Craig Nauman, February, 1999.
85. Served on the doctoral exam committee for Chuck Cranor, July, 1998.
86. Served on master's exam committee for Mihai Tutunaru, April, 1998.
87. Served on the doctoral exam committee for Michael Plezbert, June, 1997.
88. Served on master's committee for Todd Rogers, June 1997.
89. Served on master's committee for Robert Engel, January 1997.
90. Served on committee for final doctoral dissertation defense of R. Gopalakrishnan, November, 1996.
91. Served on committee for final doctoral dissertation defense of Lorrie Cranor, September, 1996.
92. Served on the doctoral dissertation topic proposal committee for Christos Papadopoulos July, 1995.
93. Served on the doctoral dissertation topic proposal committee for Charles Cranor December, 1994.
94. Served on oral exam committee for Andy Gokhale December, 1994.
95. Served on the doctoral dissertation proposal committee for Lorrie Cranor, December, 1994.
96. Served on the doctoral final dissertation defense committee for Donald Wilcox, November, 1994.
97. Served on master's committee for Madhavapeddi Shreedhar, September, 1994
98. Served on the doctoral dissertation topic proposal committee for R. Gopalakrishnan, September, 1994.

- **Doctoral Student Advisees and Co-Advisees**

1. John Robert (USA)

- **Graduated PhD Students**

1. Jaiganesh Balasubramanian, Ph.D., 2009, Citigroup Managing Director, Global Head of Market Risk Technology, New York, NY.
2. Krishnakumar Balasubramanian, Ph.D., 2007, PayPal, California.
3. Angelo Corsaro, Ph.D., 2004, PrismTechnologies, Rome, Italy.
4. Akshay Dabholkar, Ph.D, 2012, Senior Principal Engineer, Alation
5. Gan Deng, Ph.D., 2007, Google, Seattle, WA.
6. Brian Dougherty, Ph.D., 2011, Optio Labs, Nashville, TN.
7. James Edmondson, Ph.D., 2012, Chief Technology Officer, Pebble Stone Coatings, Las Vegas, NV
8. Chris Gill, Ph.D. 2001, Professor, Washington University, St. Louis, MO.
9. Andy Gokhale, Ph.D. 1998, Professor, Vanderbilt University, Nashville, TN.
10. James Hill, Ph.D., 2009, Professor, Indiana University, Purdue University, Indianapolis.
11. Joe Hoffert, Ph.D. 2011, Associate Prof at Indiana Wesleyan Univ.
12. John Kinnebrew, Ph.D., 2010, mabl, Boston, MA.
13. Arvind Krishna, Ph.D. 2005, Qualcomm, Bengaluru, India.
14. William Otte, Ph.D, 2011, Software Engineer, Nevelex Corp

15. Irfan Pyarali, Ph.D. 2001, CitiGroup, New Jersey.
16. Nilabja Roy, Ph.D. 2010, Senior Software Engineer, Bloomberg, NY, NY.
17. Carlos O’Ryan, Ph.D., 2002, Google, NY, NY.
18. Nishanth Shankaran, Ph.D., 2008, LinkedIn, Seattle, WA.
19. Nanbor Wang, Ph.D. 2004, Research Scientist, Tech-X, Boulder, Colorado.
20. Sumant Tambe, Ph.D, 2010, Staff Software Engineer, LinkedIn
21. Jules White, Ph.D., 2008, Professor, Vanderbilt University, Nashville, TN.
22. Dana Zhang, Ph.D., 2018, Associate Professor of the Practice, Vanderbilt University, Nashville, TN.

• **Graduated Master’s and Ugrad Students**

1. Alexander Babu Arulanthu, MS 1999, Sylantro, Campbell, CA.
2. Everett Anderson, BS 1998, Sun, Mountain View, CA.
3. Shawn Atkins, BS 1998, Lucent, Columbus, OH.
4. Matt Braun, BS 1998.
5. Darrell Brunsch, BS 1999, Microsoft, Redmond, WA.
6. George Edwards, BS 2004, Ph.D. student at University of Southern California.
7. Sergio Flores-Gaitan, MS 1998, Microsoft, Redmond, WA.
8. Priyanka Gontla, MS 2000, UBS, Irvine, CA.
9. Pradeep Gore, MS 2000, OOMWorks, New Jersey.
10. Tim Harrison, MS 1997, Mayasoft, Palo Alto, CA.
11. Prashant Jain, MS 1997, IBM Research, India.
12. Vishal Kachroo, MS 1999, Stentorsoft, CA.
13. Michael Kircher, BS 1998, Siemens CT, Munich, Germany.
14. Yamuna Krishnamurthy, MS 2000, OOMWorks, New Jersey.
15. Tao Lu, MS 2003, Trading Technologies, Chicago, IL.
16. Sumedh Mungee, MS 1998, Fujitsu, Santa Clara, CA.
17. Bala Natarajan, MS 2000, Veritas, India.
18. Kirthika Parameswaran, MS 2000, Telcordia, Piscataway, NJ.
19. Stoyan Paunov, MS 2006, working at Bloomberg, NYC.
20. Ossama Othman, MS 2002, independent consultant, Portland, OR.
21. Marina Spivak, MS 2000, AT Desk, Charleston, SC.
22. Nagarajan Surendran, MS 1999, Sylantro, Campbell, CA.
23. Emre Turkay, MS 2005, Turkey.
24. Pooja Varshneya, May 2010, Zircon Computing, Wayne, NJ.
25. Seth Widoff, BS 1998, independent consultant, San Francisco, CA.
26. Ming Xiong, MS 2007, currently working at AT Desk, Charleston, SC.

• **Former Staff**

1. Chris Cleeland, OCI, St. Louis, MO.
2. Ray Klefstad, Research Assistant Professor, University of California, Irvine.
3. Boris Kolpackov, Independent Consultant, South Africa.
4. Fred Kuhns, Research Associate, Washington University, St. Louis, MO.

5. David Levine, Director of Engineering, CombineNet, Inc, Pittsburgh, PA.
6. Will Otte, Institute for Software Integrated Systems, Nashville, TN
7. Jeff Parsons, Optio Labs, Nashville, TN
8. Jules White, Ph.D. 2008, Vanderbilt University, Nashville, TN

## Research Support

Total research funding since June 1995: \$42,158,523

- Sole PI: \$12,177,796
- Co-PI: \$29,980,727

## Grants and Contracts Received

1. "Children Eating Well (CHEW) Smartphone Application for WIC Families," USDA 4/15/2017 to 4/14/2024, \$962,421.84, co-PI with Pam Hull.
2. NSF, STTR Phase I: Digital Mental Health for Children and Adolescents, \$76,788.93, 8/15/22-2/15/23.
3. "Cloud-based IoT Acceptance Test Methodologies for Air Force," AFRL, \$35,000, 2/1/23-8/1/23, with Jules White.
4. "Love in a Big World-Digital Mental and Behavior Health for Children and Adolescents", NSF \$147,393, 4/1/22-2/28/23.
5. "Automated Clothing Simulation and Human Avatar Generation Engine," NSF, 9/15/2019 to 2/29/2020, \$50,000.
6. "Digital Thread Modeling Environment (DTME)," AFRL (subcontract through Securboratorion), 8/20/2019 to 8/20/2021, \$250,000, with Jules White.
7. "Creating an Evidence-based Professional Development Support Tool for Pre-K Coaches and Teachers," Department of Education (IES), \$1,399,992, 7/1/18 to 6/30/22, Co-PI with Caroline Christopher.
8. "Blockchain as Middleware Services for Transactive Energy Applications," Siemens, 4/1/2017 to 9/30/2018, \$274,397, co-PI Abhishek Dubey.
9. "Industrial Internet Architecture," Varian Medical Systems, Inc., 10/1/14 to 12/31/18, \$288,808, co-PI Jules White.
10. "Virtualize Combat System Environment, Securboratorion (ViCE)," \$15,000, 1/1/18-3/26/18, Co-PI with Jules White.
11. "Container Hopping at Random Intervals or Targeted-Attacked (CHARIOT)," OSD SBIR with Securboratorion, 1/19/17 to 1/19/18, \$35,000.
12. "A Digital Platform for Social and Emotional Learning," NSF, 7/1/2018 to 12/31/2018, \$50,000.
13. "Blockchains Data Exchange via FHIR," Solaster, 9/1/18 to 8/31/19, \$30,000, co-PI with Jules White.
14. "Advancing Data-Driven mHealth Technologies for Long-term Health and Health Behavior Change," Trans-Institutional Program (TIPs), Vanderbilt University, 9/1/2016 to 8/31/2018, \$100,000, Co-PIs Jules White, Trent Rosenbloom, and Heidi Silver.
15. "IMMoRTALS," DARPA (through subcontract with BBN Technologies and Raytheon), 12/1/15 to 12/1/19, \$1,235,567, Co-PI Jules White.
16. "The Robust Software Modeling Tool (RSMT)," ONR, 7/1/14 to 6/30/17, \$749,904, Co-PI Jules White.
17. "Building Resilient Distributed Systems for Next Generation Mobile Adhoc Cyber Physical Systems," Siemens 9/1/14 to 8/31/17, \$438,188, co-PI Abhishek Dubey.
18. "Capability-Based Technical Reference Frameworks for Open System Architecture Implementations," OSD ASDR&E, 7/3/14 to 9/11/14, \$29,690.
19. "Progressive Model Generation for Adaptive Resilient System Software," ONR STTR, 8/6/13 to

- 1/31/14, \$49,406, co-PI Jules White.
20. "Systems and Software P RodUcibility Collaboration and Experimentation Environment (S2PRUCE2)," AFRL (subcontract through Lockheed Martin Advanced Technology Lab), 1/4/13 to 9/30/13, \$108,645, with A. Gokhale.
  21. "Stochastic Hybrid Systems Modeling and Middleware-enabled DDDAS for Next-generation US Air Force Systems," AFOSR, 10/1/13 to 9/30/16, \$935,402, Co-PI(s) Aniruddha Gokhale and Xenofon Koutsoukous.
  22. "Workshop on Computing Clouds for Cyber Physical Systems," NSF, 9/15/12 to 12/31/2013, \$73,738.
  23. "Using Social Learning to Improve Adolescent Diabetes Protocol Adherence," NIH, \$1,798,029, 9/1/12-8/31/16, PI Shelagh Mulvaney.
  24. "Systems and Software P RodUcibility Collaboration and Experimentation Environment (S2PRUCE2)," AFRL (subcontract through Lockheed Martin Advanced Technology Lab), 4/3/08 to 9/30/12, \$381,708, with A. Gokhale.
  25. "Team for Research in Ubiquitous Secure Technology (TRUST)," NSF (subcontract through UC Berkeley), 6/1/05 to 10/31/15, \$5,970,900, co-PI(s) J. Sztipanovits and G. Karsai.
  26. "Android Mobile Military Middleware Objects (AMMO)," DARPA, 9/30/10 to 5/02/12, \$1,074,093, with S. Neema.
  27. "Cyber-physical multi-Core Optimization for Resource and cachE effectS (C2ORES)", AFRL, 8/1/12 to 7/31/13, \$300,000, with A. Gokhale.
  28. "Model-Driven Tools for Distributed- and Multi-Core Middleware," AFRL, 4/10/12 to 10/2/12, \$30,000, with A. Gokhale.
  29. "Cloud Environmental Analysis and Relief," NSF, 8/1/10 to 7/31/12, \$66,000, with A. Gokhale.
  30. "Environment-Specific Inter-ORB Protocols," SAIC, 8/1/09 to 5/23/12, \$348,350, with A. Gokhale.
  31. "CoSMIC and CIAO Enhancements," Northrop Grumman, 7/1/09 to 9/30/10, \$878,661
  32. "Integrating DDS and CCM," Northrop Grumman, 7/1/09 to 2/15/10, \$85,000
  33. "Early Integration and Performance Testing of Heterogeneous Computing Environments," Australian Defence Science and Technology Organization (DSTO), 1/9/09 to 7/30/09, \$180,000.
  34. "Predictive Cache Modeling and Analysis," AFRL (subcontract through Lockheed Martin Aeronautics), 3/1/10 to 9/30/11, \$100,000.
  35. "Applications of Reliable, Fast Event Notification," Raytheon, 6/1/2008 to 5/30/2009, \$60,000.
  36. "Open Modular Embedded Architectures," General Electric Global Research, 8/1/2008 to 1/31/2009, \$35,000.
  37. "Analysis and Simulation Techniques for Next-generation Motion Control Systems," Aagard, 8/1/2008 to 1/31/2009, \$13,850 with Akos Ledecz.
  38. "Open Modular Embedded Architectures," Raytheon, 8/1/2008 to 3/31/2009, \$74,276.
  39. "NAOMI," LMCO Advanced Technology Lab, 9/1/2007 to 11/30/2009, \$290,000.
  40. "IU/CRC Membership," Siemens, 1/1/2009 to 12/31/2009, \$40,000.
  41. "Enterprise Application Configuration in the Context of Model Driven Software Development and Software Factories," Siemens Corporate Research, 10/1/07 to 9/31/08 \$91,798.
  42. "Modular Extendable Demonstration of an Upgradeable Space Architecture (MEDUSA)," DARPA (subcontract through Lockheed Martin Advanced Technology Center), 2/1/2008 to 1/31/2011, \$600,000.
  43. "CCM Middleware Implementation and Integration," PrismTech, 6/8/2007 to 3/31/2007, \$33,778.
  44. "The Smart Sensor Web Architecture," NASA (subcontract through Lockheed Martin Advanced

- Technology Center), 12/15/06 to 11/14/09, \$467,728, co-PI G. Biswas.
45. "I/UCRC Membership," General motors, 1/1/2008 to 12/31/2008, \$100,000, co-PI G. Karsai.
  46. "Pollux: Enhancing the Real-time QoS of the Global Information Grid," AFRL, 2/24/06 to 7/24/08, \$1,242,718, co-PI M. Reiter.
  47. "Intelligent Middleware for Next Generation Petascale Scientific Computing," Vanderbilt Discover Grant, 5/1/05 to 6/30/07, \$100,000, co-PI(s) A. Gokhale and P. Sheldon.
  48. "Air Force Center for Research on GIG/NCES Challenges," AFOSR (subcontract through UC Berkeley), 3/1/06 to 2/28/08, \$600,000, co-PI J. Sztipanovits.
  49. "Quality of Service Enabled Dissemination," AFRL (subcontract through BBN Technologies), 12/31/2007 to 9/30/2009, \$320,000.
  50. "A Fault-Tolerant Real-Time CORBA Naming Service," US Navy (subcontract through Tech-X Corp), 11/1/2007 to 4/30/2010, \$175,000, co-PI A. Gokhale.
  51. "System Execution Modeling Technologies for Large-scale Net-centric Systems," AFRL, 1/1/2008 to 12/31/2010, \$244,000.
  52. "Model-Driven Computing for Distributed Real-time Embedded Systems," Raytheon, 8/31/04 to 8/31/08, \$500,000.
  53. "NAOMI," LMCO Advanced Technology Lab, 9/1/2007 to 11/30/2007, \$50,000.
  54. "ACE/TAO Improvement Techniques and Solutions, Veritas/Symantec, 3/31/05 to 4/31/08, \$198,500.
  55. "Adaptive Resource Control for Certifiable Systems," DARPA (subcontract through LMCO Advanced Technology Lab), 3/30/2007 to 12/31/2007, \$50,000.
  56. "Survivable Internet-scale Distributed Systems," IDA, 3/30/2007 to 12/31/2007, \$60,000.
  57. "QUality of service pICKER (QUICKER)," LMCO Advanced Technology Lab, 3/30/2007 to 12/31/2007, \$60,000.
  58. "Thimble," LMCO Advanced Technology Lab, 3/30/2007 to 12/31/2007, \$60,000.
  59. "CADynCE Experimentation Operations (CEO)," DARPA (subcontract through LMCO Advanced Technology Lab), 8/31/2007 to 12/31/2007, \$25,000.
  60. "Real-time Discovery for Pub/Sub Middleware in WANs," US Navy (subcontract through Tech-X Corp), 6/16/2007 to 9/31/2007, \$15,000.
  61. "GEMS Utilization Test Suite," LMCO Advanced Technology Lab, 9/1/07 to 11/30/07, \$50,000.
  62. "Advanced Information Systems and Technology Program," NASA (subcontract through LMCO Advanced Technology Center), 11/13/2007 to 12/1/2007, \$22,000, co-PI G. Biswas.
  63. "Design for Adaptivity and Reliable Operation of Software Intensive Systems," NSF CNS-0613971, 9/1/06 to 8/31/08, \$199,867, co-PI(s) S. Abdelwahed and G. Karsai.
  64. "Software Technologies Targeting Interoperability for Systems of Systems," Army Research Lab, 1/15/07 1/14/10, \$851,567, co-PI(s) G. Karsai and J. Sztipanovits.
  65. "Software Wind Tunnel (SWiT) Capabilities," Lockheed Martin Advanced Technology Lab, 8/1/06 to 12/31/06, \$60,000.
  66. "High-Confidence Software Platforms for Cyber-Physical Systems," NSF, 5/1/06 to 7/30/08, \$129,179.
  67. "Applying AOP to Develop of Component Synthesis with MDD," Siemens, 3/1/03 to 2/28/07, \$400,005.
  68. "Addressing Domain Evolution Challenges in Model-Driven Software Product-lines," Siemens Corporate Research, 10/1/05 9/31/07, \$100,000.
  69. "A Fault Tolerant Real-time CORBA Naming Service," US Navy (subcontract through Tech-X Corp), 11/1/05 to 8/31/06, \$15,000.
  70. "The SYstem DEployment and Configuration AssisteR (SYDECAR)," Lockheed Martin Advanced Technology Lab, 8/1/05 to 8/1/08, \$500,000.
  71. "Future Combat Systems: Software Architecture Engineering," DARPA (subcontract through Boe-

- ing), 1/28/05 to 12/31/07, \$2,764,226, co-PI(s) J. Sztipanovits and G. Karsai.
72. "Development of an Eclipse Plug-in," PrismTech, 4/28/05 to 9/30/05, \$25,000.
  73. "Prometheus: Enhancing the QoS of the JBI," AFRL, 3/25/05 to 12/31/05, \$500,000, co-PI(s) K. Birman and Mike Reiter.
  74. "A Testbed for Assuring Quality of Software for DRE Systems," ONR, 2/15/05 to 1/31/06, \$200,000, co-PI(s) A. Gokhale and A. Porter.
  75. "Enhancing the QoS of SOAs Using Eclipse-based MDD," IBM, 2/15/05 to 1/31/06, \$29,515, co-PI A. Gokhale.
  76. "Model-Driven Development of BEEP Application Protocols," Cisco, 12/15/04 to 12/14/05, \$57,976, co-PI A. Gokhale.
  77. "Evaluating CORBA Middleware for Space Systems," NASA (subcontract through Lockheed Martin Advanced Technology Center), 9/23/04 to 11/30/06, \$186,180, co-PI G. Biswas.
  78. "Refactoring Techniques to Reduce Middleware Resource Utilization," Qualcomm, 10/31/04 to 10/31/05, \$104,000, co-PI B. Natarajan.
  79. "Model-Driven Development for Software Defined Radios," BAE Systems, 12/1/04 to 3/31/05, \$32,000.
  80. "Enhancing the Robustness and Performance of TENA," DISA (subcontract through SAIC and OSC), 7/1/04 to 12/31/04, \$75,000.
  81. "QoS-enabled Fault Tolerant Middleware and MDA Tools," Lockheed Martin MSS, 4/1/03 to 12/31/04, \$516,434.
  82. "Trustworthiness in Embedded Systems," NSF ITR CCR-032574, 9/31/03 to 8/31/06, \$210,454.
  83. "ACE+TAO Enhancements," OCI, gift \$20,000.
  84. "Acquiring Accurate Dynamic Field Data Using Lightweight Instrumentation," NSF ITR CCR-0312859, 10/1/02 to 9/31/07, \$1,850,000, co-PI(s) A. Porter, D. Notkin, and A. Karr.
  85. "Intergovernmental Personnel Act," DARPA, 6/1/00 to 5/31/02, \$198,934.
  86. "Optimizing Component Models," DARPA, 4/1/01 to 6/31/02, \$210,000.
  87. "HLA RTI Next-generation," DMSO (subcontract through SAIC), 6/1/01 to 12/31/01, \$70,895.
  88. "ACE Enhancements for Windows NT and Windows CE," Siemens Medical Engineering, 2/1/00 9/19/01, \$112,000.
  89. "Scalable and Fault Tolerant Middleware," AFRL MURI, 12/1/99 to 3/31/02, \$253,701.
  90. "Protocol Engineering Research Center," AFOSR MURI, 6/15/00 to 6/14/03, \$264,720, co-PI Tatsuya Suda.
  91. "Optimizing ORBs for Network Management," Cisco Systems, 1/1/00 to 12/31/00, \$100,000.
  92. "TAO Optimizations," Raytheon, 10/1/99 to 6/01/01, \$50,000.
  93. "ACE+TAO on pSoS," Motorola, 8/15/99 to 12/31/99, \$30,000.
  94. "Real-time Distributed Object Computing," Sprint, 8/15/99 8/14/00, \$133,068.
  95. "TAO Enhancements," Krones, 8/1/99 to 9/1/99, \$5,000.
  96. "ACE Enhancements," ICOMVERSE, gift, \$20,000.
  97. "Weapon Systems Open Architecture," Boeing, 7/15/99 to 1/31/00, \$51,491.
  98. "Fault Tolerant CORBA," Motorola Labs, 7/15/99 to 7/14/00, \$139,000.
  99. "TAO Enhancements," Global MAINTTECH, 7/1/99 to 8/1/99, \$5,000.
  100. "ACE QoS Extensions," Motorola Trunking, 6/1/99 to 8/1/99, \$5,000.
  101. "CORBA Interceptors," Experian, 5/15/99 7/14/99, \$10,000.
  102. "DCOM performance evaluation," Microsoft, gift, \$30,000.

103. "TAO Improvements," OCI, 4/1/99 to 9/31/00, \$27,000.
104. "Middleware Optimizations," Telcordia, 2/1/99 to 1/31/00, \$52,700.
105. "Minimum CORBA," Hughes Data Networking, 4/1/99 to 3/31/00, \$50,000, co-PI David Levine.
106. "Framework Usage Patterns," Siemens Corporate Research, 4/1/99 to 3/31/00, \$35,000.
107. "Dynamic Scheduling and Real-time ORB Optimizations," Boeing, 10/1/98 9/30/99, \$184,860.
108. "Distributed Object Computing Middleware," Nortel, 11/1/98 10/31/99, \$75,000.
109. "ACE subsetting," Nokia, 10/8/98 4/8/99, \$30,000.
110. "Boeing Research Fellowship," Boeing, 9/1/98 8/31/00, \$81,486.
111. "Patterns and Frameworks Reuse Curriculum," Lucent Bell Labs, 9/1/98 12/31/98, \$31,200.
112. "Patterns, Frameworks, and Components," Siemens ZT, 12/1/98 5/31/00, \$175,000.
113. "High availability frameworks," Lucent, 9/1/98 8/31/99, \$39,400.
114. "Real-time Distributed Object Computing," Sprint, 8/1/98 7/31/99, \$288,194.
115. "Distributed Object Integration for the Quorum Project," DARPA S30602-98-C-0187 (subcontract through BBN), 9/1/98 8/31/01, \$448,643, co-PI(s) R. Schantz and J. Loyall.
116. "Evaluating a Framework for Dynamic Distributed Real-Time Scheduling," USENIX, gift, \$18,000.
117. "Distributed Object Computing," Microsoft, gift, \$20,000.
118. "Distributed Object Visualization Environment," Lockheed Martin, 5/1/98 to 11/31/99, \$54,000.
119. "Distributed Object Computing with Adaptive End-to-end QoS Guarantees," DARPA 9701561, 8/1/97 to 7/31/00, \$873,625.
120. "Real-time CORBA for Telecommunications," Lucent, 12/1/97 to 11/31/98, \$100,000.
121. "Developing an HLA-compliant RTI with ACE," SAIC, 12/15/97 to 1/31/00, \$228,075.
122. "Real-time CORBA for Wireless," Motorola LMPS, 10/15/97 to 10/14/98, \$200,000.
123. "Real-time CORBA for Avionics," Computing Devices International, 10/15/97 to 10/14/98, \$39,050.
124. "Dynamic Scheduling of Real-time OFPs," Boeing, 9/1/97 to 8/31/98, \$224,604.
125. "Distributed Object Visualization," Siemens MED, 10/1/97 to 9/1/98, \$40,000.
126. "The ADAPTIVE Communication Environment," Siemens MED, 10/1/97 to 9/1/98, \$70,000.
127. "The Architect's Assistant," Siemens Corporate Research, 9/1/97 to 8/1/98, \$35,000.
128. "Monitoring, Visualization, and Control of High-Speed Networks," NSF NCR-97-14698, 9/1/97 to 8/31/01, \$1,200,000, co-PI(s) G. Parulkar, E. Kraemer, J. Turner, and R. Cytron .
129. "Adaptive Software Technology Demonstration (ASTD)," AFRL (subcontract through Boeing), 9/1/98 to 8/31/02, \$1,200,000, co-PI(s) B. Doerr, D. Allen, and R. Jha.
130. "Patterns, Frameworks, and Components for Multimedia Systems," Siemens Research, 1/97 to 6/98, \$150,000.
131. "Adaptive Servers for High-Performance Imaging," Kodak Networked Imaging Tech. Center, 11/96 to 11/97, \$40,000.
132. "Real-time CORBA," Sprint, 9/96 to 12/97, \$345,000, co-PI G. Parulkar.
133. "OpenMAP – Object-Oriented Components for Real-time Avionics," McDonnell Douglas, 9/96 to 9/97, \$241,591.
134. "Compilation and Automatic Optimization of Network Protocol Implementations," NSF NCR-9628218, 8/96 to 8/99, \$411,025, co-PI(s) G. Varghese and R. Cytron (PI).
135. "Medical Imaging with Java and the WWW," SIEMENS Medical Engineering, 8/96 to 7/97, \$125,000.
136. "The ADAPTIVE Communication Environment," SIEMENS Medical Engineering, 8/96 to 7/97,

\$90,000.

137. "High-performance Distributed Medical Imaging," Kodak Imaging, 12/94 to 8/96, \$55,152, co-PI J. Blaine.
138. "Design Patterns for Concurrent Object-Oriented Networking," Object Technologies International, 4/96 to 4/97, \$25,000.
139. "Distributed Object Computing with CORBA and DCE," Bellcore, 5/96 to 12/96, \$32,978.
140. "The ADAPTIVE Communication Environment," SIEMENS Medical Engineering, 6/95 to 6/96, \$170,000.

## Courses Taught

### Courses at Vanderbilt University

1. CS 215 – Intermediate Software Design, Spring 2006
2. CS 251 – Intermediate Software Design, Spring 2007, Spring 2008, Spring 2009, Fall 2009, Spring 2010, Spring 2012, Spring 2013, Spring 2014, Spring 2015, Spring 2016, Summer 2020, Summer 2021, Summer 2022, Summer 2023
3. CS 253 – Parallel Functional Programming with Java and Android, Fall 2020, Fall 2021, Fall 2022, Fall 2023
4. CS 254 – Concurrent Object-Oriented Programming with Java and Android Spring 2021, Spring 2022, Summer 2023
5. CS 291/242 – Software Design Studio, Fall 2004
6. CS 291/242 – Software Design Studio, Fall 2003
7. CS 292 – Beyond the Oneway Web, Fall 2008
8. CS 278 – Software Engineering, Fall 2008
9. CS 279 – Software Engineering Projects, Spring 2010
10. CS 282 – Principles of Operating Systems II, Spring 2003, Spring 2004, Fall 2005, Fall 2007, Fall 2012, Fall 2013, Fall 2014, Fall 2015, Fall 2016, Spring 2017
11. UNIV 278 – Tackling Big Questions with Mobile Cloud Computing, Fall 2016, Spring 2017, Fall 2017
12. CS 395 – Advanced Network Software Design, Fall 2006
13. CS 395 – QoS-enabled Middleware, Fall 2008
14. CS 8395 – Scalable Microservices, Summer 2021, Summer 2022, Spring 2023, Spring 2024
15. DS 3891 – Special Topics in Data Science - Intro to Generative Artificial Intelligence, Fall 2023, Spring 2024
16. CS 396 – QoS-enabled Component Middleware, Spring 2005
17. CS 891 – Introduction to Concurrent and Parallel Java Programming with Android, Fall 2017
18. CS 891 – Advanced Concurrent Java Programming in Android, Spring 2018, Spring 2019, Spring 2020
19. CS 891 – Introduction to Parallel Java Programming, Fall 2018, Fall 2019
20. CS 891 – Scalable Microservices, Spring 2023, Spring 2024
21. CS 892 – Concurrent Java Programming in Android, Spring 2017

### Courses at Coursera

1. Android App Development (Android for Java; Android App Components - Intents, Activities, and Broadcast Receivers; Android App Components - Services, Local IPC, and Content Providers), 2016 to present

2. Mobile Cloud Computing with Android (Pattern-Oriented Software Architecture: Communication; Pattern-Oriented Software Architecture: Concurrency), 2014 to 2016
3. Pattern-Oriented Software Architectures for Concurrent and Networked Software, 2013

### **Courses at University of California, Irvine**

1. ECE 011 – Computational Methods in ECE, Winter 2000
2. ECE 255 – Distributed Software Architecture Design, Spring 2000
3. ICS 142 – Compiler Theory, Summer 1989
4. ICS 23 – Data Structures, Summer 1988

### **Courses at Washington University, St. Louis**

1. CS 562 – Advanced Object-Oriented Software Development with Patterns and Frameworks, Spring 1999
2. CS 242 – Introduction to Software Design, Spring 1998
3. CS 673 – Distributed Systems research seminar, Fall 1997
4. CS 422 – Operating Systems Organization, Fall 1997
5. CS 242 – Introduction to Software Design, Spring 1997
6. CS 544 – Distributed System Design, Fall 1996
7. Ada tasking course for McDonnell Douglas, Fall 1996
8. OO design course for McDonnell Douglas, Spring 1996
9. CS 523 – Distributed Operating Systems Organization, Spring 1995
10. CS 242 – Introduction to Software Design, Fall 1995
11. CS 673 – Distributed Systems research seminar, Spring 1995
12. CS 422 – Operating Systems Organization, Fall 1994

### **Other Teaching Experience**

In addition to the academic teaching experience above, I have also taught numerous short-courses and tutorials on object-oriented design patterns and programming techniques, UNIX and Windows NT systems programming and network programming, C++ and C programming languages, and various distributed/networked system, compiler construction, algorithm, data structure, mobile app, and web-based cloud computing courses for the following universities and professional organizations:

- O'Reilly Live-Training
- Pearson LiveLessons
- University Extension Program, University of California, Berkeley, CA
- University Extension Program, University of California, Irvine, CA
- University Extension Program, University of California, Los Angeles, CA
- Oregon Graduate Institute of Science and Technology, Beaverton, OR
- USENIX association
- Association of Computing Machinery (ACM)
- Addison-Wesley's Technology Exchange Program, Reading, MA
- SIGS Conferences
- Object Computing Institute, St. Louis, MO
- National University, Irvine, CA

### **Department/School/Community Service**

#### **Service at William & Mary**

1. Faculty advisor for the student-led AI Club.

### **Service at Vanderbilt University**

1. Faculty advisor for the "DataBrains" AI and Data Science student club.
2. Faculty advisor for the "Vandy Apps" student club.
3. Faculty advisor for the "BizTech" student club.
4. Led the effort to create an online Professional Master's in CS
5. Led the effort to create a continuing education program in Web Development
6. Interview panel for the Director of Professional Programs in VUSE
7. Served on the Digital Literacy committee
8. Chair of two-year review committee for Taylor Johnson
9. Chair of the CS search committee in 2003, 2005, 2013, 2016, 2018
10. Chair of the committee on Big Data for the VUSE Strategic Plan
11. Member of the Provost's Special Task Force of the Data Science Visions Working Group: Trans-institutional Master's in Data Science.
12. Member of the Provost's Data Science Visions working group
13. VUSE representative for the Research IT committee
14. VUSE representative on the Provost's Digital Literacy committee
15. Reviewer for University Course proposals
16. Faculty mentor for "Accenture Garage Program"
17. VUSE representative for the Research IT committee.
18. Member of the search committee for the first Director of the Innovation Center
19. Member of the Provost's Study Group on Cross College Teaching
20. Member of the Advisory Committee for the Vanderbilt Institute for Digital Learning (VIDL)
21. Chair of the Provost's Committee on the Innovation Center
22. Member of the VUSE Career Committee
23. VUSE point of contact for VUIT
24. Committee member for Eugene Vorobeychik's promotion case to associate professor
25. Committee member for Bobby Bodenheimer's promotion case to full professor
26. Committee member for Julie Adams's promotion case to full professor
27. Committee member for Akos Ledeczki's promotion case to full professor
28. Chair of the tenure committee for Yuan Xue
29. Chair of the four-year review committee for Yuan Xue
30. Member of the two-year committee for Yuan Xue
31. Member of the promotion committee for Ted Bapty
32. Member of review committee for Xenofon Koutsoukos
33. Chair of promotion committee for Gabor Karsai
34. Member of promotion committee for Gautam Biswas
35. Chair of the VUSE Technology Entrepreneurship Task Force
36. Member of the VUIT faculty advisory committee
37. Owen-VUSE joint committee for 2014-2015
38. Chair of the Schmidt Family Annual Educational Technologies Lectureship

39. Member of the Provost's Study Group on Cross College Teaching
40. Chair of two-year review committee for Eugene Vorobeychik
41. Member of the Chancellor's Social Media and the Internet committee
42. Member of the VU Online Education Task Force
43. Member of the ad hoc committee on EECS Industrial Advisory Board
44. Ex-officio member of the ad hoc committee on the CS graduate program
45. Ex-officio member of the ad hoc committee on the CS undergraduate program
46. Faculty facilitator for the Vanderbilt Visions program
47. Chair of the Information Technology committee for the Vanderbilt School of Engineering
48. Chair of the tenure committee for Bobby Bodenheimer
49. EECS Corporate/Internship Liaison for Computer Science and Engineering
50. Ex-officio Member of the Ad Hoc Committee on Computer Engineering
51. Faculty sponsor of the new EECS Graduate Student Organization
52. Member of the VUSE Research Institutes and Centers Council
53. Associate Chair of Computer Science and Engineering
54. Member of the Vanderbilt University Faculty Senate
55. Chair of the faculty committee on Academic Computing and Information Technology (ACIT)
56. Member of the Research Advisory Committee on Information Technology (RACIT)
57. Chair of the Systems Engineering concentration committee
58. Member of the Plan Integration and Communication Group (PICG)
59. Member of the CS graduate curriculum committee

### **Service at Washington University, St. Louis**

1. Member of the Faculty recruiting committee
2. Member of the CS committee on recruiting industrial graduate students (RIGS)
3. Member of the CS Experimental Infrastructure for Teaching and Research (CEITR)
4. Member of the Introductory course committee
5. Member of the Graduate admission committee
6. Member of the CS representative to the CEC advisory board
7. Member of CS departmental chair search committee

### **Honors and Awards**

1. Elected to the Virginia Academy of Science, Engineering, and Medicine, July 2025.
2. Inducted into the Information and Computer Science (ICS) Hall of Fame at the University of California, Irvine.
3. Nominated by President Biden and unanimously confirmed by the United States Senate to become the Director of Operational Test and Evaluation for the United States Department of Defense, February 2024.
4. Received the 2023 AJ Award for Leading and Advancing from the Software Engineering Institute at Carnegie Mellon University for my work on the Long Range Stand Off (LRSO) project.
5. Received the 2022 AJ Award for Leading and Advancing from the Software Engineering Institute at Carnegie Mellon University for my work on the "Architecting the Future of Software Engineering: A National Agenda for Software Engineering Research & Development" study.
6. Received the Cornelius Vanderbilt Professor of Engineering endowed chair in February 2017.
7. Received the 2015 Award for Excellence in Teaching by the Vanderbilt University School of Engi-

neering.

8. Interviewed for Software Engineering Radio ([www.se-radio.net/](http://www.se-radio.net/)).
9. Vice-chair of the IEEE Chapter in middle Tennessee.
10. Elected to three-year term as member of the Vanderbilt University Faculty Senate.
11. Invited speaker at the dedication of the Henry Samueli School of Engineering, along with UC Irvine Chancellor, Ralph Cicerone; Dean of the School of Engineering, Nicolaos Alexopoulos; Chairperson of the Regents of the University of California, S. Sue Johnson; President of the University of California, Dick Atkinson; and CTO and co-founder of Broadcom Henry Samueli.
12. Interviewed for Dr. Dobb's journal TechNetCast, October 24, 2000.
13. Interviewed for **iX** magazine, October, 2000.
14. Received early promotion to tenure as an Associated Professor at Washington University, St. Louis, five years after joining the faculty as an Assistant Professor in 1994.
15. Director of the "Center for Distributed Object Computing" at Washington University, St. Louis since spring of 1999.
16. Listed in Marquis' "Who's Who in Media and Communications," 1997.
17. Received joint appointment to the Mallinckrodt Institute Department of Radiology, Washington University School of Medicine, February 1996.
18. Selected to participate in the ACM OOPSLA '94 Doctoral Symposium.
19. Invited by Dr. Martina Zitterbart to participate in a 4-week international exchange program at the Universität Karlsruhe Institut für Telematik in Karlsruhe, Germany, April 1993.
20. Served as elected representative to the Associated Graduate Student organization at the University of California, Irvine from May 1991 to June 1992.
21. Served as elected graduate student representative to the Computer Science Computing Resource Committee at the University of California, Irvine from August 1988 to August 1990.

## Consulting and Expert Work

1. ARINC, Fountain Valley, CA
2. ACM, NY, NY
3. Advanced Institute of Information Technology, Seoul, Korea
4. AG Communication Systems, Phoenix, AZ
5. Anderson Consulting, Chicago, IL
6. Apple, Cupertino, CA
7. AT&T Research, Murray Hill, NJ
8. BAE Systems, Greenlawn, NY
9. BAE Systems, Wayne, NJ
10. Bartlit Beck, Chicago, IL
11. BEA, San Jose, CA
12. Bellcore, Morristown, NJ
13. BellSouth, Atlanta, GA
14. Boeing, St. Louis, MO
15. Boies, Schiller, & Flexner, Santa Monica, CA
16. Bureau Brandeis, Amsterdam, Netherlands
17. Bridges & Mavrakakis, Palo Alto, CA
18. Cooley LLP, San Francisco, CA
19. Correct Care Solutions, Nashville, TN

20. Credit Suisse, Zurich, Switzerland
21. Cooley, Boston, MA
22. Cravath, Swaine, & Moore, NY, NY
23. Crosskeys, Ottawa, Canada
24. DARPA, Arlington, VA
25. Desmarais, NY, NY
26. Duane Morris, Atlanta, GA
27. Edward D. Jones, St. Louis, MO
28. Envision Inc. St. Louis, MO
29. Ericsson, Cypress, CA
30. Fitzpatrick, Cella, Harper & Scinto, NY, NY
31. Fish and Richardson, Boston, MA
32. GaN Corporation, Huntsville, AL
33. Gibson, Dunn, & Crutcher, NY, NY
34. Goldman, Ismail, Tomaselli, Brennan, & Baum, Chicago, IL
35. Hogan & Lovalls, Washington DC
36. Jet Propulsion Lab, Pasadena, CA
37. Kasowitz, Benson, & Torres, Redwood Shores, CA
38. Keystone Strategy, Boston, MA
39. Kilpatrick Stockton, Atlanta, GA
40. Kirkland & Ellis, San Francisco, CA
41. Kodak Imaging, Rochester, NY
42. Latham & Watkins, Washington DC
43. Laureate University, Baltimore, MD
44. Lee Sullivan Shea & Smith, Chicago, IL
45. Lockheed Martin Tactical Systems, Minneapolis, MN
46. Lockheed Martin Mission Systems, Boulder, CO
47. Lockheed Martin Advanced Technology Lab, Cherry Hill, NJ
48. Lucent Bell Labs, Naperville, IL
49. Lucent Bell Labs, Murray Hill, NJ
50. Lucent, Whippany, NJ
51. McDonnell Douglas, St. Louis, MO
52. Microsoft, Redmond, WA
53. Morrison & Foerster, Washington DC
54. Morgan Stanley, New York, NY
55. Motorola Cellular Infrastructure Group, Arlington Heights, IL
56. Motorola Iridium, Chandler, AZ
57. Motorola Land Mobile Products, Chicago, IL
58. National Security Agency, Ft. Meade, MD
59. Naval Air Weapons Stations, China Lake, CA
60. Nelson Mullins, Houston, TX

61. Nortel, Ottawa, Canada
62. Object Computing Institute, St. Louis, MO
63. Object Technologies International, Ottawa, CA
64. Odetics Broadcasting, Anaheim, CA
65. Oracle, Redwood Shores, CA
66. Orrick, Los Angeles, CA
67. Park, Vaughan, & Fleming, Boise, ID
68. Pearson Education, London, UK
69. Pragmatus, Alexandria VA
70. PrismTechnologies, Newcastle, UK
71. Qualcomm, San Diego, CA
72. Quinn Emanuel, NY, NY
73. Raytheon, San Diego, CA
74. Reichman Jorgensen, CA
75. Riverace, Boston, MA
76. Rubin Anders Scientific, Boston, MA
77. SAIC, Washington D.C.
78. Schafer Corp, Washington D.C.
79. Schwegman, Lundbert, & Woessner, Minneapolis, MN
80. Skadden, Arps, Slate, Meagher & Flom, NY, NY
81. Securboration, Melbourne, FL
82. Siemens Medical Engineering, Erlangen, Germany
83. Siemens Corporate Research, Princeton, NJ
84. SIGS, New York, NY
85. Software Engineering Institute, Pittsburgh, PA
86. Teradyne, Chicago, IL
87. Teledyne, Thousand Oaks, CA
88. UC Berkeley Extension, Palo Alto, CA
89. UCLA Extension, Los Angeles, CA
90. USENIX, Lake Forest, CA
91. Venable, NY, NY
92. Wong, Cabello, Lutsch, Rutherford & Brucculeri, Houston, TX
93. WMS Gaming, Chicago, IL
94. Zircon Computing, Wayne, NJ

## **Expert Testimony**

1. March 2016, Deposed in support of Oracle in the Oracle vs. Google Fair Use trial in the United States District Court for the Northern District of California, San Francisco division. Case No. Civ. A. No. 10-03561 WHA.
2. May 2016, Testified in support of Oracle in the Oracle vs. Google Fair Use trial in the United States District Court for the Northern District of California, San Francisco division. Case No. Civ. A. No. 10-03561 WHA.
3. February 2017, Deposed in support of IBM in the IBM vs. Priceline Group case. Case No. Civ. A.

- N. 15-cv-137-LPS-CJB.
4. February 2018, Deposed in support of IBM in the IBM vs. Groupon case. Case No. Civ A. N. 16-122-LPS-CJB.
  5. July 2018, Testified in support of IBM in the IBM vs. Groupon case. Case No. Civ A. N. 16-122-LPS-CJB.
  6. August 2018, Deposed in support of Palo Alto Networks in the Palo Alto Networks vs. Implicit case. Case No. Civ 6:17-CV-182-JRG.
  7. January 2019, Deposed in support of C3IoT in the E2.0 vs. C3IoT case. Case No. 1:15-cv-00530-GMS.
  8. February 2019, Testified in support of C3IoT in the E2.0 vs. C3IoT case. Case No. 1:15-cv-00530-GMS.
  9. June 2019, Deposed in support of IBM in the IBM vs. Expedia Inc. case. Civil Action No. IPR2018-01136.
  10. July 2019, Deposed in support of Philips in the Philips vs. Microsoft case. Civil Action No. 4:18-cv-01885-HSG.
  11. August 2019, Deposed in support of Philips in the Philips vs. HTC case. Civil Action No. 4:18-cv-01885-HSG.
  12. August 2019, Deposed in support of Philips in the Philips vs. ASUS case. Civil Action No. 4:18-cv-01885-HSG.
  13. September 2019, Deposed in support of Kroy in the Kroy vs. Groupon case. Civil Action No. IPR2019-00044.
  14. September 2019, Deposed in support of Kroy in the Kroy vs. Groupon case. Civil Action No. IPR2019-00061.
  15. March 2020, Deposed in support of Cisco in the Centriptal vs. Cisco case. Civil Action No. 2:18-cv-00094-HCM-LRL.
  16. May 2020, Testified in support of Cisco in the Centriptal vs. Cisco case. Civil Action No. 2:18-cv-00094-HCM-LRL.
  17. Jan 2021, Deposed in support of Droplets in the Droplets vs. Yahoo case. Civil Action No. 12-CV-03733-JST.
  18. Jan 2021, Deposed in support of Droplets in the Droplets vs. Nordstrom case. Civil Action No. 12-CV-04049.
  19. June 2021, Deposed in support of Sonos in the Sonos vs. Google case. Civil Action No. 6:20-cv-00881-ADA.
  20. September 2021, Deposed in support of IBM in the IBM vs. Zillow case. Civil Action No. IPR2020-01655.
  21. November 2021, Deposed in support of Apple in the Apple vs. Identity Security case. Civil Action No. 6:21-CV-460-ADA.
  22. January 2022, Deposed in support of IBM in the IBM vs. Chewy case. Civil Action No. 1:21-cv-01319-JSR.
  23. February 2022, Deposed in support of Droplets in the Droplets vs. Yahoo case. Civil Action No. 12-CV-03733-JST.
  24. March 2022, Deposed in support of Sonos in the Sonos vs. Google case. Civil Action No. 3:21-cv-7559.
  25. March 2022, Testified in support of Droplets in the Droplets vs. Yahoo case. Civil Action No. 12-CV-03733-JST.
  26. May 2022, Deposed in support of the plaintiffs in the Google Play Consumer Antitrust Litigation. Civil Action No. 3:20-cv-05761-JD.
  27. July 2022, Deposed in support of the State of Arizona in the State of Arizona vs Google case. Civil Action No. CV2020-006219.

28. July 2022, Deposed in support of Johnson and Johnson in the Johnson and Johnson vs Alcon case. Civil Action No. 20-842 (CFC) (JLH).
29. July 2022, Deposed in support of LinkedIn in the LinkedIn vs. hiQ case. Civil Action No. 17-cv-03301-EMC.
30. August 2022, Deposed in support of Salesforce in the Salesforce vs. Applications in Internet Time case. Civil Action No. 3:13-CV-00628-RCJ-CLB.
31. January 2023, Deposed in support of Csupo et. al in the Attila Csupo, Andrew Burke, and Kerry Hecht v. Alphabet case. Civil Action No. 19CV352557.
32. February 2023, Deposed in support of Sonos in the Google vs. Sonos case. Civil Action No. 3:20-cv-06754-WHA.
33. April 2023, Deposed in support of Carr et. al in the Google Play Consumer Antitrust Litigation, Case No. 3:20-cv-05761-JD.
34. April 2023, Deposed in support of Carbonite Inc, in Ruben A. Luna et al. V. Carbonite, Inc. Mohamad S. Ali, and Anthony Folger, Case No. No. 19-cv-11662-LTS.
35. June 2023, Testified in support of Sonos in the Google vs. Sonos case. Civil Action No. 3:20-cv-06754-WHA.
36. August 2023, Deposed in support of Salesforce in the Salesforce vs. WSOU case. Civil Action No. 6:20-cv-01164-ADA.
37. September 2023, Deposed in support of Vector Flow in HID Global Corporation vs. Vector Flow, Inc. et al., Civil Action No. Civil Case No. 21-1769.
38. September 2023, Deposed in support of IBM in IBM vs. Rakuten, Civil Action No. 21-00461-GBW.
39. November 2023, Deposed in support of Title Source, Inc in Title Source, Inc vs. HouseCanary, Civil Action No. 2016-CI-06300.
40. February 2024, Testified in support of Vector Flow in HID Global Corporation vs. Vector Flow, Inc. et al., Civil Action No. Civil Case No. 21-1769.
41. February 2024, Deposed in support of Salesforce in WSOA Investments vs. Salesforce, Civil Action No. 6:20-cv-01165-ADA.
42. April 2024, Deposed in support of the State of Texas in the State of Texas vs. Google, Civil Action Cause no. 22-01-88230-D.
43. April 2024, Testified in support of the State of Texas in the State of Texas vs. Google, Civil Action No. Cause no. 22-01-88230-D.
44. June 2025, Testified in support of Csupo et. al in the Attila Csupo, Andrew Burke, and Kerry Hecht v. Alphabet case. Civil Action No. 19CV352557.

## Summary of Professional Accomplishments and Impact

Since graduating with my Ph.D. in 1994, I have led influential R&D efforts at William & Mary, Vanderbilt University, Carnegie Mellon University's Software Engineering Institute (SEI), the Defense Advanced Projects Research Agency (DARPA), the University of California Irvine, and Washington University St. Louis.

### Research Contributions and Impact

At Vanderbilt University, I was a Senior Researcher at the Institute for Software Integrated Systems, which conducts world-class research on model-driven engineering (MDE) tools and middleware platforms for intelligent cyber-physical systems (CPS) and mobile cloud computing applications. Over the past three decades I led research projects on a range of topics, including patterns, optimization techniques, and empirical analyses of software frameworks that facilitate the development of quality of service (QoS)- enabled middleware and MDE techniques/tools for cyber-physical systems and mobile cloud computing applications running over wired/wireless networks and embedded system interconnects. Recently my research focused on prompt engineering techniques and patterns that enhance the accuracy and expressiveness of large language models (LLMs) and generative augmented intelligence (AI+) platforms.

The research approach throughout my career has generally involved:

- *Creating* innovative middleware, MDE, and AI+ technologies, such as design formalisms, prompt patterns, QoS specification-/enforcement techniques, end-to-end and cross-layer middleware optimizations, and automated tools for specifying, analyzing, and synthesizing dependable software from higher-level domain-specific models and LLM prompts.
- *Applying* these technologies in conjunction with multi-disciplinary teams of colleagues in academia and industry to demonstrate and mature middleware, MDE, and AI+ technologies and tools in the context of research and production mission-critical cyber-physical systems and mobile cloud computing applications.
- *Amplifying* the adoption and transition of these technologies in academia and industry via 650+ publications, 600+ tutorials and invited talks, millions of lines of popular open-source software, and scores of innovative face-to-face and online courses published and delivered to more than 400,000 students around the world.

The R&D efforts I led have had a significant impact on academic research and commercial practice. For example, dozens of universities throughout the world use the middleware, MDE, and AI+ tools my research group has developed as the basis for their research and teaching efforts. Moreover, the open-source middleware frameworks, MDE, and AI+ tools generated from projects I've led constitute some of the most successful examples of software R&D ever transitioned from research to industry, being widely used by thousands of companies and agencies worldwide in many domains for three decades.

In particular, the ACE and TAO middleware frameworks developed by the DOC Group are used by developers in thousands of companies (such as Boeing, Cisco, Ericsson, Facebook, Kodak, Lockheed Martin, Lucent, Mercedes-Benz, Motorola, NASA/JPL, Nokia, Nortel, Raytheon, SAIC, Siemens, Sprint, and Telcordia) in a wide range of domains (such as telecom/datacom, healthcare, process automation, avionics, homeland security and defense, financial services, online gaming, social media, and distributed interactive simulation).

For example, my work on middleware for cyber-physical systems has transitioned to the Joint Tactical Terminal (JTT) and Joint Tactical Radio System (JTRS) software defined radio programs, manned/unmanned com-bat air vehicles, the Orbital Express low earth orbit (LEO) satellite telemetry and control framework, the Ground Support System (GSS) for the X33 Single Stage To Orbit (SSTO) Reusable Launch Vehicle, and the USS Ronald Reagan ship self-defense system (SSDS), the USAF upgraded early warning radar system, the DMSO HLA/RTI and DISA TENA distributed interactive simulation middleware, among many other DoD applications. Likewise, my work on enterprise dynamic resource management algorithms, component deployment and configuration middleware for system integration, and model-based tools for system execution modeling and performance analysis has transitioned to many DoD acquisition programs, including the Navy's DDG 1000 Land Attack Destroyer and AEGIS Open Architecture initiative.

## Teaching Contributions and Impact

I have taught scores of cutting-edge courses on topics relating to object-oriented design and programming, software patterns, middleware for distributed real-time and embedded systems, concurrent and networked programming with C++ and Java, and mobile cloud computing with Android. I received the 2015 Award for Excellence in Teaching by the Vanderbilt University School of Engineering. In addition, I've taught 10 popular MOOCs at Vanderbilt on topics related to pattern-oriented mobile cloud computing with Android to over 400,000 learners from around the world.

I co-taught one of the first cross-college University Courses at Vanderbilt on "Tackling Big Problems with Mobile Cloud Computing," where ten highly diverse teams consisting of 11 arts and science students and 44 computer science students were mentored by 11 faculty from the College of Arts and Sciences, the School of Nursing, the School of Law, the School of Medicine, the School of Engineering and Vanderbilt University Medical Center. The projects in this course addressed relevant, real-world problems involving mobile cloud computing technologies, including:

- Effectively engaging young people with chronic diseases and medical conditions, such as diabetes, asthma and obesity
- Creating "smarter" cities and sustainable energy platforms via an app-based transportation hub for Nashville, and remotely monitoring the safety and operations of novel sources of power, including solar, wind and natural gas, and
- Helping economically disadvantaged individuals bridge the digital divide to obtain better guidance on medical and legal matters.

## University Service and Leadership

I have engaged in the following service and leadership capacities at William & Mary and Vanderbilt University during the past two decades:

- **Dean of the School of Computing, Data Sciences, and Physics at the College of William and Mary.** Report to the Provost and am responsible for (1) uniting the school's four areas (computer science, data science, applied science and physics) into a cohesive academic unit and growing their research, grant funding and doctoral program enrollment, (2) establishing a vision with strategic objectives to ensure the school becomes nationally known as an inclusive and innovative leader in teaching and research, and (3) supporting faculty in their research, teaching and service work; leading fundraising efforts and the financial management of the school; and building or strengthening its strategic partnerships.
- **Associate Provost for Research.** I served as the Associate Provost for Research at Vanderbilt University from July 2018 to June 2022. In this capacity I developed cohesive and sustainable information technology (IT) services and governance frameworks to advance research and scholarship across Vanderbilt's ten schools and colleges, including scalable and secure storage, processing, and communication solutions; big data research cores and correlated services, and regulatory-compliant IT services (such as data governance frameworks in accordance with GDPR and NIST 800-171 compliance regimes). I also oversaw Vanderbilt's "software-research-engineer for hire" service that provides researchers with on-demand access to shared technology expertise, which helps them develop research IT solutions, especially with data-intensive workflows, while also enabling shared developers to add value to multiple research programs throughout Vanderbilt. In my capacity as the Associate Provost for Research I chaired the Digital Services and Projects Working Group and Research IT Faculty Advisory Committee, which evaluates digital services and project support available across campus and assesses future needs to create a range of research-oriented tools and products, including online content and videos, digital collections and archives, dashboards, research gateways, and data visualizations.
- **Data Sciences Initiatives.** I am deeply involved in Vanderbilt's initiatives on Data Science. From August 2018 to June 2022, I served as a founding Co-Director of the Data Science Institute at Vanderbilt (which focuses on graduate students). I also served as the Director of the Data Science Minor (which focuses on undergraduate students) during 2021. During the past several years I co-chaired Data Science: Next-Generation committee on behalf of the Vanderbilt Provost. I also served as a member of the ad hoc committee on Big Data for the Vanderbilt University School of Engineering (VUSE) strategic planning process, as well as served on the Provost's Special Task Force on a trans-institutional Master's in Data Science and the Provost's Working Group on Data Science Visions, which sets the direction for trans-institutional Data Science research. In addition, I created and gave a presentation on "Big Data" for the Vanderbilt University Board of Trust in the spring of 2017 that helped initiate Vanderbilt's investment in the Data Science Institute.
- **EECS and CS Department Leadership.** I served as the Associate Chair of the Electrical Engineering and Computer Science (EECS) department at Vanderbilt University from 2004 to July 2018 and as the Associate Chair of the Computer Science department at Vanderbilt University from July 2022 to the present. In this capacity I worked with the EECS and CS Chair to provide intellectual leadership and assist in EE, CS, and CompE faculty hiring, curricular development, and course staffing. I also represented Vanderbilt at the bi-annual CRA "CS Chairs" meeting at Snowbird Utah from 2008 to 2018. My recent focus is on innovative digital learning techniques (such as pre-recording material and/or recording lectures in class so students can watch to them at their leisure to ensure they master the course material) to handle the surge in undergraduate CS enrollment without adversely affecting Vanderbilt's commitment to high quality education. I also spearheaded several initiatives to create a continuing education program focused on web development in partnership with Trilogy Education Services and a professional master's degree program in CS.
- **Digital Learning.** I have played a significant role in Vanderbilt's digital learning initiatives, including teaching (1) the first Massive Open Online Course (MOOC) at Vanderbilt in 2013 on "Pattern-Oriented Software Architecture for Concurrent and Networked Systems", (2) the first trans-institutional MOOC Specialization (together with the University of Maryland, College Park) in 2014 on "Mobile Cloud Computing with Android", (3) Coursera Specializations on "Android App Development" since the spring of 2016 and "Scalable Microservices for Developers" since the fall of 2023, and (4) an online Computer Science professional master's degree that Fortune magazine ranked #1 in 2022. I also played a key role in formulating the Vanderbilt digital learning strategy as a member of the Advisory Committee for the Vanderbilt Institute for Digital Learning (VIDL), a member of the Provost's Online Education Committee, a member of the Vanderbilt Online Education Task Force, a

member of the Chancellor's Social Media and the Internet committee, chair of the Schmidt Family Annual Educational Technologies Lectureship, and a member of the Provost's committee on Digital Literacy that ensures all Vanderbilt students learn computational thinking in their undergraduate experience.

- **Cross-College Teaching.** I led Vanderbilt University's forays into Cross-College teaching, where I served on the Vanderbilt Online Education committee and served as a member of the Provost's Study Group on Cross College Teaching, which formulated the concept of "University Courses" that brings faculty from multiple schools to actively engage students of diverse backgrounds and promote new and creative trans-institutional learning. I also created/taught one of the first University Courses on "Tackling Big Problems with Mobile Cloud Computing." In 2016 and 2017 I taught this course in a multidisciplinary environment where students from multiple schools teamed with computer science students to address questions like how mobile cloud computing technologies can engage young people with chronic diseases; change political discourse in the United States and around the world; and help economically disadvantaged individuals bridge the digital divide to obtain better guidance on nutrition and legal matters. I also spearheaded the effort to create a Computer Science course on "the beauty and joy of computing" and a Data Science course on "Introduction to Generative AI" to teach computational thinking to non-CS majors at Vanderbilt University.
- **Information Technology Infrastructure for Research.** Over the past two decades I've held leadership roles in the Vanderbilt University Information Technology (VUIT) planning and governance processes, most recently as a member of the Provosts IT Risk Committee. In my role as the Associate Provost for Research (see above) I oversaw the high-performance computing cloud capabilities at Vanderbilt's Advanced Computing Center for Research and Education (ACCRES). I also chaired the faculty committee on Academic Computing and Information Technology (ACIT), served as the Vanderbilt University School of Engineering (VUSE) point of contact for VUIT, the VUSE representative for the Research IT committee, as well as served as a member of the VU Computer Security Incident Response Team that manages and supports the overall response process associated with impactful security incidents, a member of the Research Advisory Committee on Information Technology (RACIT), and a member of the Provost's Research IT Special Project Working Group, which focuses on supporting the research needs of all schools at Vanderbilt.
- **Entrepreneurship.** I have been deeply involved in entrepreneurial activities throughout my career. I led the Vanderbilt University School of Engineering (VUSE) Technology Entrepreneurship Task Force, which enhanced the high-tech eco-system in Nashville by helping students, faculty, and staff launch startup companies in the region. I was also part of the committee that established Vanderbilt's innovation center called the Wond'ry and have served as a mentor for high-profile entrepreneurial activities held at the Wond'ry, including the Accenture-sponsored "Innovation Garage" program. In addition, I served as the Chief Technology Officer and/or consultant for several companies that commercialized the ACE and TAO middleware platforms based on my research distributed real-time and embedded systems, which has generated over 200 million dollars of revenue during the past three decades.

**Inclusive Excellence initiatives.** In my roles at Vanderbilt University and William & Mary, I have spearheaded specific initiatives to cultivate a more inclusive community. Recognizing the underrepresentation of women and minorities in engineering fields, I led efforts to revamp the Computer Science and Data Science curricula, e.g., by introducing inter-disciplinary courses that address broader societal impacts of computing and data analytics, which attracted a broader demographic of students. I've collaborated with faculty to integrate inclusive teaching practices and offer workshops that highlight the contributions of diverse scientists and technologists. In addition, I've mentored students from varied backgrounds and created scholarship programs that remove financial and cultural barriers that often discourage these students from pursuing engineering disciplines. These efforts are central to my broader goal of enriching the educational experience at Vanderbilt University and William & Mary, fostering a learning environment where every student can thrive and see themselves as future leaders in engineering. My belief in the transformative power of education drives my ongoing commitment to develop academic communities that are as varied and vibrant as the society they serve.

## Professional Leadership

I have engaged in the following professional leadership capacities over the past three decades:

- **Government Leadership.** I was nominated by President Biden and unanimously confirmed by the United States Senate in 2024 to serve as the Director of Operational Test and Evaluation (DOT&E),

reporting to the Secretary of Defense. This position was responsible for assessing the effectiveness, suitability, survivability, and (when necessary) lethality of United States military systems. From 2000 to 2003 I served as a Program Manager at the DARPA Information Technology Office (ITO) and Information eXploitation Office (IXO), as well as the Deputy Director for DARPA ITO. In these roles I led the national R&D effort on QoS-enabled middleware for cyber-physical systems (CPS), including the Total Ship Computing Environment for the US Navy's DDG 1000 Land Attack Destroyer program and AEGIS Open Architecture program, as well as several US Air Force time-critical targeting programs. From 2001 to 2003 I served as Co-chair (together with Frank Anger from the NSF) for the Software Design and Productivity (SDP) Coordinating Group. In this role I helped to formulate the multi-agency research agenda in large-scale, high confidence software design for the Federal government's Network and Information Technology Research and Development (NITRD) Program, which is the collaborative IT research effort of the major Federal science and technology agencies.

- **Government Service.** From 2010 to 2014 I served a member of the Air Force Scientific Advisory Board, where I was the Vice Chair of a study on Cyber Situational Awareness for Air Force mission operations and a member of a study on processes, methods, and tools for effectively sustaining aging aircraft at US Air Force maintenance and sustainment depots. From 2013 to 2015 I served on the Advisory Board for the joint US Navy/Army Future Airborne Capability Environment (FACE). From 2013 to 2015 I served as co-lead for the US Navy's Open Systems Architecture initiative task area on "Published Open Interfaces and Standards". Since 2017 I provided software and systems engineering expertise on multiple DoD enterprise computing projects, including the Navy PEOSUB program, the Air Force AWACS and E7 programs, and joint Missile Defense Agency (MDA) program, the Air Force Ground Based Strategic Defense (GBSD) program, and the Air Force Long-Range Stand Off (LRSO) program.
- **FFRDC Leadership.** From 2010 to 2012 I served as the Deputy Director of Research and Chief Technology Officer of the Federally Funded Research & Development Center (FFRDC) known as the Software Engineering Institute (SEI) at Carnegie Mellon University (CMU). In this role I formulated the SEI's strategy for research and acquisition projects by aligning the expertise of the SEI technical staff to identify/respond to the needs of sponsors, customers, and partners in software engineering and cyber-security. During this time period I also co-led efforts in other US government agencies and FFRDCs (such as NIST, MITRE, Aerospace, and Lincoln Labs) to shape future innovations in complex software-reliant system development, certification, and deployment. I continue to work with the CMU SEI as a Visiting Scientist, where I have helped formulate the Generative AI research strategy for the Software Solutions Division (SSD).
- **Industry Leadership.** From 2006 to 2010 I served as the Chief Technology Officer for two companies, Zircon Computing (2009 to 2010), and Prism Technologies (2006-2008). As CTO I directed the technical vision and strategic R&D investments for these companies in the domains of enterprise and embedded distributed real-time and embedded systems. From 2014 to 2017 I served on the Board of Directors for Real-Time Innovations (RTI), which is a leader in QoS-enabled middleware for the Industrial Internet of Things.

## Measures of Career Accomplishments

Measures of my career accomplishments include the following:

- **Publications and presentations.** I have published 700+ works (138 journal papers, 217 conference papers, 5 books, 5 book-length reports, 3 edited book collections, 70 book chapters, 75 workshop papers, 165 trade magazine and newsletter/blog articles, 32 editorials and book forewords, and 14 short papers and posters). My papers have appeared in the most selective journals (*e.g.*, ACM Transactions in Embedded Computing Systems, IEEE Transactions on Parallel and Distributed Systems, IEEE Transactions on Software Engineering, IEEE Transactions on Computing, IEEE Journal of Selected Areas of Communications, and ACM Transactions on Autonomous and Adaptive Systems) and conferences (*e.g.*, ACM SIGCOMM, ACM OOPSLA, IEEE INFOCOM, IEEE ICDCS, IEEE RTAS, ACM/IEEE Middleware, and the ACM/IEEE ICSE) in my field. I have also given 650+ invited talks and tutorials world-wide.
- **Measures of scholarly impact.** My publications have been cited 51,000+ times across a comprehensive spectrum of high-impact venues. My g-index is 217, my h-index is 96, and my i10 index is 389. These bibliometrics indicate the significant impact of my publications as a researcher in the field of Computing.
- **Funding.** Since June 1995 I have been a PI or co-PI for grants, contracts, and gifts totaling more than

\$42 million dollars. I have been the sole PI for over \$12 million dollars of this amount.

- **Graduate advising and training.** During my academic career I have (co-)advised and graduated 19 doctoral students and over 25 master's students.
- **Professional service and leadership.** In addition to my academic service and leadership roles, I have engaged in the following government and industry professional service and leadership capacities during my career:
  - In 2024 I served as the Director of Operational Test & Evaluation, which is a President-appointed, Senate-confirmed senior leadership position at the United States Department of Defense.
  - From 2013 to 2015 I served on the Advisory Board for the joint US Navy/Army Future Airborne Capability Environment (FACE).
  - From 2013 to 2015 I served as co-lead of a task area on "Published Open Interfaces and Standards" for the US Navy's Open Systems Architecture initiative.
  - From 2010 to 2014 I served a member of the Air Force Scientific Advisory Board, where I was the Vice Chair of a study on Cyber Situational Awareness for Air Force mission operations.
  - From 2006 to 2011 I served as the Chief Technology Officer for the Software Engineering Institute at Carnegie Mellon University (2010 to 2011), Zircon Computing (2009 to 2010), and Prism Technologies (2006-2008), where I was responsible for directing the technical vision and strategic R&D investments.
  - From 2000 to 2003 I served as a Program Manager at the DARPA Information Technology Office (ITO) and Information eXploitation Office (IXO) the Deputy Director for DARPA ITO, where I lead the national R&D effort on QoS-enabled middleware for DRE systems.
  - From 2001 to 2003 I served as Co-chair for the Software Design and Productivity (SDP) Coordinating Group, which formulates the multi-agency research agenda in fundamental software design for the Federal government's Information Technology Research and Development (IT R&D) Program, which is the collaborative IT research effort of the major Federal science and technology agencies.
  - Served as general chair or program (co)-chair for 35 conferences, tutorial chair for 4 conferences, co-organized 14 workshops, and served on the program committees for over 245 ACM, IEEE, IFIP, USENIX, and OMG conferences.
  - Served as guest editor of 13 ACM, IEEE, and USENIX journals, and served as editor-in-chief of the C++ Report magazine.